

The London School of Economics and Political Science

Leveraging large-scale behavioural change interventions using social norms, civic culture, and installations.

An analysis of classic interventions and new experiments to tackle social challenges.

Paulius Yamin Slotkus

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Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

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I confirm that sections 4.1, 5.1, and 6.1 (which correspond to the three papers presented) were jointly co-authored with the people listed in section 1 and in each of the papers. I also confirm that, as described with more detail at the start of each of these sections, I wrote 95% of all papers and I contributed the following percentages of the necessary research work:

- Paper 1 (section 4.1): 90%
- Paper 2 (section 5.1): 90%
- Paper 3 (section 6.1): 95%

Abstract

This thesis explores how interventions based on changing social norms can transform the behaviour of people and contribute to tackle social and policy challenges in real-world contexts. Specifically, it focuses on how a policy experience that had important and enduring effects in a large city (the civic culture interventions of Antanas Mockus in Bogotá, Colombia), could inform the application of more effective and sustainable interventions than those that are typically applied in the academic literature.

To do this, three studies were conducted to explore (i) the intervention strategies and mechanisms that social norm interventions apply to achieve behavioural change (through a systematic review of over 90 field studies), (ii) the narratives through which different policy actors interpret and disseminate intervention messages (through narratives from citizens, the press and designers about Mockus' most iconic intervention), and (iii) the way in which interventions that leverage social norms can reconfigure the physical, psychological and social layers of local installations (through two long-term experimental interventions to change driving behaviours among truck drivers).

While typical social norm interventions in the academic literature tend to use easy-to-implement one-size-fits-all mechanisms (based mostly on giving group summary information to students remotely), our results illustrate the need and the potential of applying social norm interventions that:

- Use strategically a wider range of intervention mechanisms that are closer to where behaviour actually happens and leverage social interactions
- Reconfigure the local physical, psychological, and social determinants of behaviour in a way that is tailored to the target contexts and behaviours, creating collective self-reflections on participants and giving them tools for social regulation and change
- Create engaging narratives around the behaviours and social expectations that must change, reframing social challenges and the agency of different actors around them

Our findings offer indications of a valuable and cost-effective approach to behavioural and social norm change that promotes collective reflection, engagement and action (rather than boring instructions, prohibitions, punishments or automatic nudging), and that thus has a higher potential of achieving enduring large-scale transformations in complex challenges than other approaches that are common in policy and organizational settings. By offering insights into the orientation and practical techniques of these interventions, as well as discussing implications for both researchers and practitioners, we hope to inform more effective and sustainable interventions to tackle social challenges in the real world.

Y cuando las palabras se agotan, queda el arte.

[And when words are exhausted, art remains]

Antanas Mockus

(quoted in Contreras, 2010)

*Our knowledge has made us cynical. Our cleverness,
hard and unkind. We think too much and feel too little.
[...]*

*More than cleverness we need kindness and
gentleness. Without these qualities, life will be violent
and all will be lost.*

Charlie Chaplin, *The Great Dictator*

(Chaplin, 1940)

Table of contents

Abstract	5
Acknowledgements	9
Funding	10
1. Introduction	11
Co-authors	14
2. Conceptual framework	16
2.1. Social norms and behavioural change	16
2.1.1. Theories, models and techniques of behavioural change	16
2.1.2. Social norms and behavioural change interventions.....	22
2.2. A new approach to behavioural change using social norms	38
2.2.1. The Civic Culture approach of Antanas Mockus	38
2.2.2. Installations and local determinants of behaviour	44
2.2.3. Narratives, drama and policy interventions	46
3. Research strategy and methodology	56
3.1. Research problem	56
3.2. Research strategy.....	58
3.2.1. Study 1: A systematic review of behavioural change interventions based on social norms	59
3.2.2. Study 2: A qualitative study to analyse the narratives that key policy actors share about Mockus' interventions.....	62
3.2.3. Study 3: A field experiment to test the effects of a social norm intervention based on the Installation Theory framework	66
4. Study 1: A systematic review of behavioural change interventions based on social norms 73	
4.1. Paper 1: "Using Social Norms to Change Behavior and Increase Sustainability in the Real World: a Systematic Review of the Literature"	74
5. Study 2: A qualitative study to analyse the narratives that key policy actors share about Mockus' interventions	116
5.1. Paper 2: "The Power of Narratives in Behavioural Policy Interventions in the City: a Study of the Civic Culture Interventions of Antanas Mockus in Bogotá, Colombia"	117
6. Study 3: a field experiment to test the effects of a social norm intervention based on the Installation Theory framework.....	161
6.1. Paper 3: "Local Determinants of Driving Behaviors: Installation Theory Interventions to Reduce Fuel Consumption Among Truck Drivers in Colombia"	162
7. Discussion	189

7.1. Towards a wider range of strategies and mechanisms of intervention	189
7.2. Towards interventions that create good stories, collective self-observation and collective action.....	193
7.3. Towards interventions that analyse and reconfigure social, physical and psychological determinants of behaviour	198
7.4. What Mockus' initiatives can teach us about behavioural change interventions based on social norms	201
7.5. Outreach and practical applications	205
7.6. Limitations and further research	207
7.7. Conclusions	211
References	216
Annexes	254
1. Theoretical concepts to classify models and theories of behaviour and behavioural change	255
2. Main elements in applied models of behavioural change.....	269
3. Research ethics reviews from the London School of Economics and Political Science and the Department of Psychological and Behavioural Science	274
4. Data Management Plan for the project.....	290
5. Systematic review research protocol and codebook (Study 1)	296
6. Complete list of coded studies (Study 1)	301
7. Multiple Correspondence Analysis output and coordinate plot (Study 1)	328
8. Citizen questionnaire (Study 2)	331
9. Sample press, citizen and designer narratives (Study 2)	346
10. Basic statistics and characteristic words and phrases for Thematic Classes (Study 2)	353
11. Multiple Correspondence Analysis output and coordinate plots (Study 2)	357
12. Narrative Policy Framework codebook (Study 2)	361
13. Subjective Evidence-Based Ethnography ethics note (Study 3)	363
14. Sample driver replay-interview data (Study 3)	365
15. Copies of intervention mechanisms used (Study 3)	374
16. Experimental data summary table (Study 3)	377
17. Experimental data distribution for Driving Parameter Alerts (DPAs) (Study 3)	378

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1. Introduction

Changing our everyday behaviours can change the world¹. Some of the most pressing social challenges we face can be solved by transforming specific aspects of our collective trends of behaviour. Behavioural change can avoid many massive crises, or at least reduce some of their negative consequences. And while legislative changes, education programmes or large-scale policies are often used to try to influence the behaviour of people in the real world (Ruiz & Murraín, 2012, pp. 2–4), behavioural change interventions² offer a valuable complement to them, and can sometimes achieve or boost large-scale transformations at a fraction of the time and cost (Paluck & Ball, 2010; Yamin, 2012).

Administrators, policy makers and other actors across the world are increasingly understanding and developing this potential in a wide variety of policy areas (see John et al., 2014; Sunstein, 2016). Among them are the “nudge” units that are being created in many countries (Sunstein, 2016), the more than 200 institutions working on regulatory compliance through behavioural insights with the OECD (2017), the efforts by the European Commission to use behavioural sciences in policy-making (Bavel et al., 2013), or the work that various agencies of the United Nations are doing to include behavioural insights to advance sustainable development goals (UNICEF - UNDP, 2016; Yamin & Hobden, n.d.), to mention just a few examples.

Tackling the challenges linked to environmental and social sustainability that our planet currently faces cannot be done without important and long-term transformations on the everyday behaviours of individuals: “Desirable goals, such as lowering greenhouse gas emissions, reducing waste, and increasing energy and water efficiency can be met only if high levels of public participation are achieved” (McKenzie-Mohr, 2011, p. 544). The COVID-19 crisis has shown, as few global crises in recent times, how the capacity of societies and individuals to adapt to changing conditions in order to avoid or reduce the effects of crises can often depend on changes in everyday behaviours and routines (in this case, for example, linked to handwashing, physical contact or transportation needs). Such behavioural changes do not occur spontaneously as policies are established; therefore “behavioural change” must be designed. Because of this, even the best

¹ As Joseph Grenny argues in his great TEDx Talk: *Change Behaviour – Change the World* (Grenny, 2013).

² The term “intervention” is used in this project as an “action or entity that is introduced into a system to achieve some result” (USAID, 2009, p. 6). Specifically, it will be understood as an intentionally introduced modification in a socio-technical system (Lahlou, 2017, p. 66) applied with the objective of changing a specific behaviour in a real-world context (and not, as it is sometimes used, in a broader range of actions such as legislation changes or educational programmes).

meaning and most sophisticated management systems, policies, laws or programs require some behavioural change to succeed, and can often fail if these changes do not happen (see for example Mackie, 2017; Mockus, 2002; Yamin, 2013). Applying insights and interventions from the psychological and behavioural sciences therefore has the potential to vastly increase the real-world impact of regulatory and other policy initiatives.

An especially promising approach to behavioural change interventions in real world contexts is the one based on social norms (Bicchieri et al., 2014; Darnton, 2008b; John et al., 2014; Tankard & Paluck, 2016). Influencing social norms, or the rules that describe what a certain reference group considers to be typical or desirable behaviour in certain contexts and situations (Miller & Prentice, 1996), is a popular way in which researchers and practitioners attempt to transform behaviour in real-world contexts (see Bicchieri et al., 2014; Cislighi & Heise, 2018b; Darnton, 2008b; John et al., 2014; Sunstein, 2016b; Tankard & Paluck, 2016; Yamin et al., 2019). Examples of this include the research agendas of Cristina Bicchieri at the University of Pennsylvania (Bicchieri, 2006, pp. 8–28, 2017; Bicchieri et al., 2014), of Elizabeth Levy Paluck and Deborah Prentice at Princeton University (Miller & Prentice, 2013, 2016; Paluck, 2009a, 2009b; Paluck & Shepherd, 2012), of Maria Lapinski, Rajiv Rimal and colleagues working on the Theory of Normative Social Behaviour at John Hopkins and Michigan State Universities (Lapinski et al., 2017; Lapinski & Rimal, 2005; Mollen, Rimal, Ruiter, & Kok, 2013; Rimal & Real, 2005), and of Beniamino Cislighi at the London School of Hygiene and Tropical Medicine (Cislighi & Heise, 2018a, 2019; Legros & Cislighi, 2020), to mention a few. In policy areas, the work that international networks and organizations are doing around the world (especially in public health and gender norms), is another example of this. A few of these include the work of UNFPA and UNICEF in female genital mutilation and child marriage (UNFPA-UNICEF, 2016), UNDP in gender inequalities (Conceicao et al., 2020), the International Rescue Committee in gender-based violence (Paluck & Ball, 2010), the ALiGN Platform (ALiGN, 2020), or the Sould Beat Africa Network (The Communication Initiative Network, 2020).

Researchers in many disciplines have found relevant effects of social norm interventions in domains as varied as pro-environmental behaviours (Bateson et al., 2013; Kormos et al., 2015; Pellerano et al., 2016; Schultz, 1999), violence, harassment and conflict (such as Gidycz, Orchowski, & Berkowitz, 2011; Paluck, 2009; Paluck & Shepherd, 2012), health related and risk behaviours (such as Bewick et al., 2013; Chernoff & Davison, 2005; Cislighi & Heise, 2018a, 2018b; Lapinski, Maloney, Braz, & Shulman, 2013; McCoy et al., 2017), and even ethical behaviours (Brudermann et al., 2015), gambling (Celio & Lisman, 2014; Neighbors et al., 2015) and tax-paying (Wenzel, 2005), to mention a few. In the behavioural economics perspective that has become so popular in

academic and policy settings, social norms are one of the “freedom-preserving tools (or ‘Nudges’)”³ (Sunstein, 2016, p. 36) that have achieved policy-relevant behavioural changes with “even larger effects than significant economic incentives” (Sunstein, 2016, p. 1) and that “significantly reduce economic and environmental costs” (Sunstein, 2016, p. 19) in different fields.

But nevertheless, the social norm interventions that are prevalent in the literature have had mixed effects in changing behavioural outcomes, including both their immediate effectiveness and the endurance of the changes over time (see Cialdini, Reno, & Kallgren, 1990; John et al., 2014; Lapinski & Rimal, 2005; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). In contrast to this, the interventions applied by Antanas Mockus (Mockus, 2002; Tognato, 2017; Yamin, 2013), which have not been studied in depth under a psychological focus, show that behavioural change interventions based on social norms can be much more effective and durable than previously recognized (John et al., 2014), even in scales as big as whole cities. In an attempt to understand how behavioural change interventions based on social norms can be made more effective to transform behaviour in real-world contexts, this project explored some of the psychological factors that might be associated with the increased effectivity associated with Mockus’ interventions.

Specifically, we conducted three studies that aimed to explore three critical elements that seem to distinguish Mockus’ interventions from the social norm interventions that are typically applied in the literature, and which have clear developments in the psychological and behavioural literature. These include the practical intervention strategies and mechanisms used to achieve behavioural change (Study 1 – Paper 1), the narratives through which participants and other key actors interpret and disseminate intervention messages (Study 2 – Paper 2), and the intentional reconfiguration of the physical, psychological and social determinants of behaviour in local settings (Study 3 – Paper 3).

This document, which I am presenting to the LSE Department of Psychological and Behavioural Science as a PhD by publication, includes the three papers and the Framing Materials that develop the integrating background, conceptual framework, research strategy and discussion elements of my project. After this introduction, which recognizes the co-authors that contributed to the studies, I present the literature review and conceptual framework that informs the project (on section 2), and which focuses both on the psychological literature about social norms and behavioural change (section 2.1), and on a psychological understanding of the new approach that

³ These include interventions to influence choice by simplification or setting defaults, by reminding or priming options, by making previous commitments or leveraging social influence, by affecting incentives, by giving more or less information, by fixing or deterring attention, by increasing or decreasing the speed of the decisions and by manipulating self-image.

Mockus' interventions provide (section 2.2). Then, I turn to the general research strategy of the project (section 3 and 3.1) and I provide an overview of the methodology chosen for each of the studies we conducted (section 3.2). The three papers produced are then presented, each with a short explanatory preface (sections 4 to 6). Finally, I present a general discussion about the importance of the findings of the three studies and of the project as a whole (sections 7 and 7.1 to 7.4), together with the outreach and practical application activities conducted in the project (section 7.5) and its limitations and suggestions for future research (section 7.6). Finally, conclusions are presented in the last section (7.7) and Annexes listed at the end.

Co-authors

I believe that research should be a collective effort, and that my own skills, ideas, networks and access are very limited compared to what even a small group of co-authors can achieve. I am proud to say that this research project is a collective effort. Although I conceived, designed, conducted, coordinated and wrote most of the research (as consigned in the declaration above), this project would be much poorer without the contributions of my co-authors, my supervisor, and the rest of people that provided me with ideas, data collection support, feedback and encouragement.

In this short section, I present the profiles of the 6 co-authors that took part in the project's papers. Then, in the preface of each study (sections 4.1, 4.2 and 4.3), I have specified the contributions made by each one of them. These framing materials, while relying on elements from the studies, were entirely written by me. In accordance to this, throughout the text (with the exception of the papers), I use the "I" pronoun when referring to work I did myself or to my own reflections, and the "we" pronoun when it was done in collaboration with my supervisor and my other co-authors.

- **Professor Saadi Lahlou** (PhD project supervisor – co-author in studies 1, 2 and 3): Chair of Social Psychology at the London School of Economics and Political Science and Director of the Paris Institute for Advanced Studies. He has published more than 150 papers, books and reports, and he has been the Director the Consumer Research department of the Centre for Lifestyles and Social Policies (Crédoc, Paris), the Laboratory of Design for Cognition at EDF R&D, the Department of Social Psychology at LSE, and a member of the board of the Commissariat Général du Plan (French Prime Minister's office).

- **Santiago Ortega** (co-author in studies 2 and 3): Social engineer' and social entrepreneur based in Bogotá, Colombia. He graduated as Mechanical Engineer from the *Universidad de los Andes* (Colombia), and has over 9 years of experience with both heavy cargo transportation, and behavioural change and citizenship culture interventions with high social impact. He is a co-founder of the *Hacker Ciudadano* social collective and works at the Centre for Public Digital Innovation of the Ministry of Communication and Information Technologies.
- **Maria Fei** (co-author in study 1): BSc in Decision Science and Psychology from Carnegie Mellon University and MSc in Psychology of Economic Life at LSE. She is currently a Research Manager at the Behavioural Science Lead at Ipsos Healthcare in London, U.K. She is interested in leveraging behavioural science for social change and improving the environmental sustainability of human activity.
- **Sara Levy** (co-author in study 1): Insights professional specialised in consumer behaviour with experience as a research manager in both the telecom and internet industries. She currently works as an Insights Manager, EMEA Brand and Consumer Insights at Google in London, U.K. She completed a Bachelor in Business Administration (BBA) at the University of Brasilia (UnB), a Bachelor in Media Studies - Advertising at Centro Universitário de Brasilia (UnICEUB), a MA in Marketing at Escola Superior de Propaganda e Marketing (ESPM) and holds a MSc in Psychology of Economic Life from LSE.
- **Andrés Sáenz** (co-author in study 2): B.A. in Government and International Relations from the *Universidad Externado de Colombia* and M.A. in Development and Governance from Duisburg-Essen University (Germany). He is a lecturer at the School of Management of the *Universidad del Rosario* (Colombia) and as the Colombia Program Manager at CIVIX. He is also a co- founder of the *Hacker Ciudadano* social collective.
- **Dr. Viktor Skrickij** (co-author in study 3): PhD in Transport Engineering from Vilnius Gediminas Technical University (VGTU). He is an Associate Professor at the Faculty of Transport Engineering at VGTU and the current Director of the Transport and Logistics Competence Centre.

2. Conceptual framework

This section presents the general literature review and conceptual framework that guided this research project. It is divided in two complementary sections. The first (2.1) presents an overview of psychological research around theories, models, and strategies of behavioural change (in 2.1.1) and about the concept of social norms and its relationship to human behaviour (in 2.2.2). The second (2.2) focuses on the main theories and concepts behind the alternative approach to social norm interventions that this project focuses on, including the Civic Culture approach of Antanas Mockus (2.2.1), the local determinants of behaviour in local installations (2.2.2) and the role of narratives and drama in behavioural and policy interventions (2.2.3).

2.1. Social norms and behavioural change

2.1.1. Theories, models and techniques of behavioural change

Theories of behaviour and behavioural change

Initiatives that attempt to change behaviour should be informed by theories and models of behaviour and behavioural change to increase their chances of success (Darnton, 2008b; Davis, Campbell, Hildon, Hobbs, & Michie, 2015). This is beneficial both for policy and research: policy interventions that aim to change behaviour benefit from using concepts and tools that are linked to fundamental psychological processes and that have been empirically tested, while research benefits from the data generated when theories are put to test and to real-world challenges and solutions for them. Nevertheless, reviews such as Davis et al.'s (2015) found that few interventions explicitly use theories of behavioural change (22.5% according to them); rather, they are referred to generally, without being rigorously applied to the design and evaluation of interventions. Even fewer seem to establish clear links between their theoretical frameworks and the behavioural change techniques they use (10% according to Michie & Prestwich, 2010).

The literature on behaviour and behavioural change is immense and covers a wide range of disciplines, including Social Psychology, Health Sciences, Sociology, Anthropology, Communication Studies, International Development and Economics (Darnton, 2008b; Davis et al., 2015; Legros & Cislighi, 2020). By cross-referencing some recent reviews on the matter (see Brennan et al., 2014, p. 409; Darnton, 2008b, 2008a; Davis et al., 2015; Donovan, 2011; Michie et al., 2014; Sánchez &

Guerrero, 2015), it is possible to identify as much as 138 different theories and models of behaviour and behavioural change that are being used in interventions and policies, or that are recognized by experts in the field as influential (and that count is most probably not complete).

These theories are based on a wide range of different concepts to explain behaviour, which can be classified into broad groups (see Darnton, 2008b). The following table (1) presents some of the most popular groups of concepts, while Annex 1 of this document presents more details and a complete list of these theories:

Table 1. Theoretical concepts to classify models and theories of behaviour (adapted and complemented from Darnton [2008b])

Concepts	Behaviour is driven by:	Examples
Social regulation and social norms	Shared rules about typical or desirable behaviours in certain situations (Tankard & Paluck, 2016)	(Ajzen, 1991; Cialdini et al., 1990; Rimal et al., 2005)
Attitudes, values and beliefs	Attitudes, defined as “the learned, relatively stable tendency to respond to people, concepts, and events in an evaluative way” (Gerrig & Zimbardo, 2010, p. 694)	(Ajzen, 1991; Fishbein & Ajzen, 1975; Rogers, 1975; Rosenstock, 2005)
Economic assumptions	Rational (and irrational) choice processes	(Kahneman & Tversky, 1979; Simon, 1967; Stanovich & West, 2000)
Information deficit	Information, and the way it shapes knowledge, attitudes and behaviour	(Blake, 1999; Kotler, 1999)
Self-efficacy and control	Our own beliefs that we can perform a certain action and that the action will bring an expected outcome (self-efficacy)	(Ajzen, 1991; Bandura, 1978; Hovland et al., 1953)
Self-regulation	Our capacity to adjust our own actions according to the feedback we directly or indirectly receive (self-regulation)	(Bandura, 1991; Carver & Scheier, 1982)
Habits and routines	Repeated actions and routines	(Gerrard et al., 2008; Prochaska et al., 2008; Triandis, 1977)
Emotions	Emotions, broadly understood as “a pattern of changes, including physiological arousal, feelings, cognitive processes, and behavioural reactions, made in response to a situation perceived to be personally significant” (Gerrig & Zimbardo, 2010, p. 444)	(Kitchen et al., 2014; Kollmuss & Agyeman, 2002; Loewenstein et al., 2001)
Contextual and societal factors	Contexts and broader societal factors at play where the behaviour occurs	(Dahlgren & Whitehead, 2006; Lahlou, 2017;

Concepts	Behaviour is driven by:	Examples
		Spaargaren, 2011; Steg & Vlek, 2009; Triandis, 1977)

In addition to those, there are also theories and concepts that focus specifically on explaining behavioural change. The following table (2) presents some of the most popular examples:

Table 2. Theoretical concepts to classify models and theories of behavioural change (adapted and complemented from Darnton [2008b])

Change through:	Behaviour is mainly changed by:	Relevant references
Social norms	Changing the perceptions that people have about the shared rules that define typical or desirable behaviours in certain situations (Tankard & Paluck, 2016)	(R. B. Cialdini et al., 1990; Miller & Prentice, 2016; Mockus, 2002; Tankard & Paluck, 2016)
Learning processes	Learning, understood as the acquisition of new information or skills, previous experiences, or the continuous feedback we get when behaving in a certain way or trying to change something (Darnton, 2008b)	(Argyris, 1982; Fisher et al., 2002; Monroe et al., 2015; Vare & Scott, 2007)
Habits	Formation, maintenance and abandonment of habits as both barriers to behaviour change and conditions for their sustainability over time	(Bandura, 1978; Gerrard et al., 2008; Wieber et al., 2015)
Social networks	Dissemination and maintenance of behaviour changes through groups of people, conceptualized as networks.	(Bogart et al., 2016; McMichael & Shipworth, 2013; Putnam, 2000; E. Rogers, 2003)
Narratives	Changing the “narratives that people have about themselves and the social world” (Wilson, 2011, p. 10) “core beliefs or other aspects of the self and thus people’s behaviour as it unfolds over time in diverse settings” (Kentthirarajah & Walton, 2015, p. 2)	(Kentthirarajah & Walton, 2015; Walton, 2014; Wilson, 2011)
Choice architecture	Transforming the “social environment” in which choices are made (Sunstein, 2016, p. 718) “in a way that will make choosers better off, as judged by themselves” (Thaler & Sunstein, 2008, p. 5)	(Sunstein, 2016; Thaler & Sunstein, 2008)

Change through:	Behaviour is mainly changed by:	Relevant references
Systems	Analysing and transforming the whole system that supports the current situation, rather than detached factors.	(Butland et al., 2007; Kim & Senge, 1994; Lahlou, 2017; Scharmer, 2009)

Applied models of behavioural change

In contrast with the theories mentioned above, which are concerned with explaining why, when and how does behaviour and behavioural change happen, applied models of behavioural change provide clear procedures and instructions to describe and design behavioural change interventions, often in real-world contexts. There is also a wide variety of applied models of behavioural change which differ considerably in their essential characteristics and objectives (see Brennan et al., 2014, p. 409; Darnton, 2008b). And although the steps and tools they propose seem obvious, few social norm interventions in the literature seem to have an explicit strategy to take advantage of them (or at the very least, they omit to mention their use). Just as with theoretical concepts, interventions can and should take advantage and make explicit the steps and tools they used in their design, implementation, and evaluation.

In order to gain a better understanding of the nature of these models and their critical steps, I reviewed the 14 applied models of behavioural change that are included in two well-known reviews on the topic (Brennan et al., 2014, p. 409; Darnton, 2008b). For clarity purposes, I have divided these steps into the four successive stages that are generally followed in policy interventions: diagnostic, design, implementation, and evaluation⁴. An additional title called “transversal” identifies those actions that according to the models should be performed during the whole process.

⁴ The models and abbreviations used are: Communication for Development –**C4D** (UNICEF, 2016); Community-Based Prevention Marketing –**CBPM** (Bryant et al., 2000); Community-Based Social Marketing –**CBSM** (Chaudhary & Warner, 2015; McKenzie-Mohr, 2011, p. 1); Community Readiness Model –**CRM** (Kelly et al., 2003); Cultural Capital Framework –**CCF** (Knott et al., 2008); DEFRA’s 4Es Model –**4E** (Eppel et al., 2013); EAST Framework to Apply Behavioural Change Insights –**EAST** (Service et al., 2014); Eight Step Process for Leading Change –**8S** (Kotter, 2011, p. 2); Intervention Mapping Model –**IM** (Kok, 2014); Nine Principles for Developing Behavioural Change Interventions –**9P** (Darnton, 2008b); Principles for Intervening to Change Environmentally Destructive Behaviour –**CEDB** (P. C. Stern, 2000); Six-Stage Model of Social Marketing –**MSM** (Andreasen, 2011); Social Norms and Change Technique –**SNCT** (UNFPA-UNICEF, 2016); and System Failure –**SF** (Chapman, 2004, p. 34).

The complete description of each of the 12 elements I identified can be accessed in Annex 2. The following table (3) provides a summary of these elements and the models in which they are described.

Table 3. Main steps in applied models of behavioural change

DIAGNOSTIC		IMPLEMENTATION		EVALUATION	
Elements	Guides in	Elements	Guides in	Elements	Guides in
Identify and prioritize target behaviours	9P (Darnton, 2008b) CBSM (Chaudhary & Warner, 2015)	Pilots and pre-tests	CBSM (Chaudhary & Warner, 2015) IM (Kok, 2014) MSM (Andreasen, 2011)	Reliable outcome measures	CBSM (Chaudhary & Warner, 2015) CEDB (P. C. Stern, 2000) IM (Kok, 2014) SF (Chapman, 2004, p 34)
Diagnostics (contexts, groups, behaviours)	9P (Darnton, 2008b) CEDB (P. C. Stern, 2000) CBPM (Bryant et al., 2000) IM (Kok, 2014) CBSM (Chaudhary & Warner, 2015) SF(Chapman, 2004, p. 34)	Short term or early wins	8S (Kotter, 2011, p. 2) SF (Chapman, 2004, p. 34)	Expanding effects and institutionalizing	CBSM (Chaudhary & Warner, 2015) CRM (Kelly et al., 2003) 8S (Kotter, 2011, p. 2)
Previous research and experiences	9P (Darnton, 2008b)				
DESIGN					
Intervention design – basic characteristics	4E (Eppel et al., 2013) CCF (Knott et al., 2008) EAST (Service et al., 2014) CRM (Kelly et al., 2003)				

TRANSVERSAL	
Elements	Guides in
Collective action	8S (Kotter, 2011, p. 2) 9P (Darnton, 2008b) C4D (UNICEF, 2016) CBPM (Bryant et al., 2000) CRM (Kelly et al., 2003) IM (Kok, 2014) SNTC (UNFPA-UNICEF, 2016)
Stakeholder and participant validation	CEDB (P. C. Stern, 2000)

	CBSM (Chaudhary & Warner, 2015) IM (Kok, 2014)
Monitoring and evaluation cycle	9P (Darnton, 2008b) CEDB (P. C. Stern, 2000) CBPM (Bryant et al., 2000) IM (Kok, 2014) MSM (Andreasen, 2011)
From behavioural to social change	C4D (UNICEF, 2016) CCF (Knott et al., 2008) CRM (Kelly et al., 2003)

Behavioural Change Techniques

Finally, there are other authors that have focused on the specific techniques and mechanisms that behavioural change interventions leverage to influence behaviour. A particularly useful and evidence-based example is the Behavioural Change Techniques –BCT by Michie et al. (Michie et al., 2011, 2013). Using systematic reviews of interventions and consultation with interdisciplinary experts, they identified 93 BCTs grouped in 16 clusters, including (1) scheduled consequences, (2) reward and threat, (3) repetition and submission, (4) antecedents, (5) associations, (6) covert learning, (7) natural consequences, (8) feedback and monitoring, (9) goals and planning, (10) social support, (11) comparison of behaviour, (12) self-belief, (13) comparison of outcomes, (14) identity, (15) shaping knowledge and (16) regulation (Michie et al., 2013).

In a less systematic but equally useful exercise, Sunstein (2016) has also identified 31 types of nudges (or “freedom-preserving tools”, Sunstein, 2016, p. 36) that are commonly used in interventions that target specific decisions. This includes interventions to influence choice by simplification or setting defaults, by reminding or priming options, by making previous commitments or leveraging social influence, by affecting incentives, by giving more or less information, by fixing or deterring attention, by increasing or decreasing the speed of the decisions or by manipulating self-image. But although relevant and useful, these accounts fail to consider directly the potential of social regulation and its related mechanisms (in the case of Michie et al., 2013, p. 92, which rather includes more general processes such as social support or comparison of behaviours), or don’t to explore the specific techniques and mechanisms that can be used to leverage social norms (in the case of Sunstein, 2016).

In the field of social norms, popular and influential texts (Bicchieri, 2017, pp. 142–162; Miller & Prentice, 2016; Paluck, 2009a) have described a few of the practical mechanisms that have been

used to achieve behavioural change in social norm interventions. These include, for example, the Social Norm marketing approach, the Personalized Normative Feedback approach, and focus groups discussions (Miller & Prentice, 2016), media campaigns (Bicchieri, 2017, pp. 142–162; Paluck, 2009a), and also legal means, economic incentives, and deliberation (Bicchieri, 2017, pp. 142–162). Nevertheless, these are only a small proportion of the intervention strategies and mechanisms than can and have been used in social norm interventions (as we hypothesised and Study 1 showed, see below). A systematic framework to better describe and organize a wider range of the strategies and mechanisms that are specific to social norm interventions could greatly inform the understanding both of Mockus' interventions and the general experimental literature on social norms and behaviours change.

2.1.2. Social norms and behavioural change interventions

Social norms have been a central topic in social psychological research for a long time (i.e. Allport, 1920; Asch, 1952, p. 457, 1955; Sherif, 1936). They can be broadly defined as the rules that describe what a certain reference group considers to be typical or desirable behaviour in a certain situation (Tankard & Paluck, 2016). Social norms determine the behaviours that, among all those that are possible in a given situation, “others (as a group, as a community, as a society...) think are the correct ones, for one reason or another” (Lahlou, 2017, p. 105). Since in most situations it is not possible to know the actual rates of behaviour and the actual opinions of all the people in a group, social norms usually work through the beliefs and perceptions that people have (Tankard & Paluck, 2016), and are interwoven with the “various constructs [that] contribute to creating a web of meanings that affects how people feel, think, and act” (Legros & Cislighi, 2020, p. 63). Social norms mark our membership and place in a group, how we perceive social situations, how we relate and interact with others, and how we respond to cultural products (Sherif, 1965, pp. 1–5). They are thus strongly linked with our identity and with how we identify ourselves with certain groups (Tajfel & Turner, 1979; Turner, 1987).

Social psychological research has explored a wide range of reasons why individuals comply with social norms and social influence. These include imitation (Hardecker & Tomasello, 2016; Vlaev & Dolan, 2015), the desire to comply with the majority (Asch, 1955) or minority (Moscovici & Personnaz, 1980) trends, identity, membership to a group and identification with others (Festinger, 1954; Tajfel & Turner, 1979; Terry et al., 2000), emotions (Elster, 2010, p. 104) and social sanctions (Allport, 1920), as well as positive motivations such as the desire to please others (Bicchieri, 2006,

p. 23), to cooperate (Lahlou, 2017, p. 105) or to gain recognition (Mockus, 2002). In our everyday life, both compliance with and deviance from social norms can therefore have important social consequences and can be a source of both positive and negative emotions (Legros & Cislighi, 2020; Mockus, 2002; Prentice & Miller, 1993).

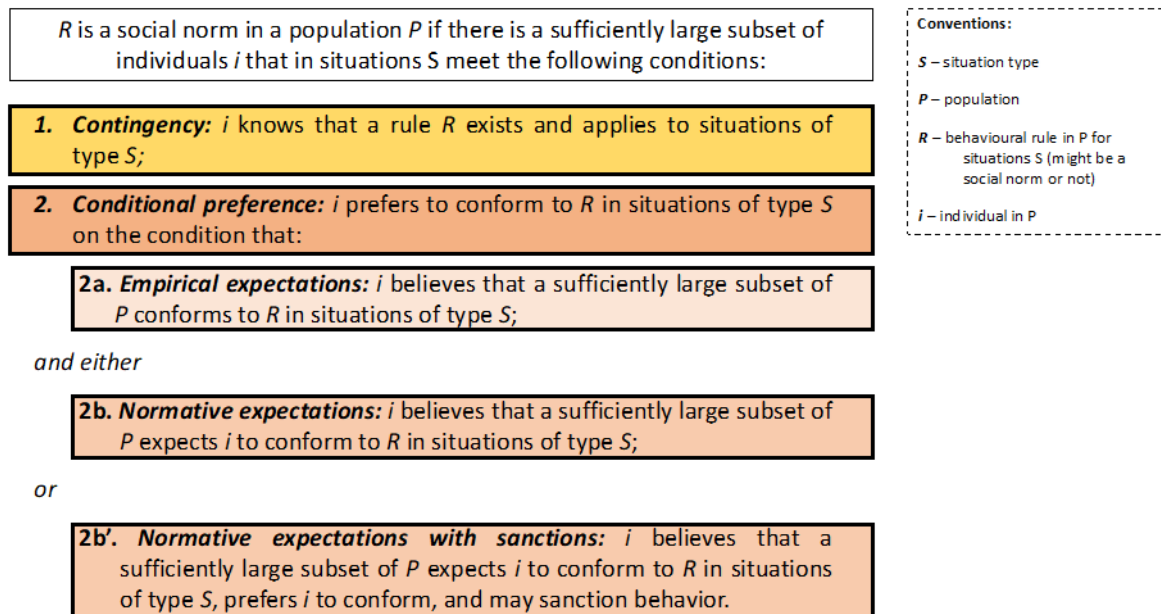
And although the extent to which social norms can explain, predict and transform behaviour is a controversial matter⁵ and cannot be taken as a universal solution (Bicchieri, 2006, p. 11; Cialdini et al., 1990; Legros & Cislighi, 2020; Pool & Schwegler, 2007), there is a growing literature in psychological and behavioural sciences that has further developed the concept of social norms, and that has produced compelling empirical evidence of a strong but qualified link between collective trends of behaviour and social norms (see Bicchieri, 2006, p. 11, 2017, pp. 50–76; R. B. Cialdini et al., 1990; Elster, 1989; John et al., 2014; Kenny & Hastings, 2011, p. 61; Lapinski & Rimal, 2005; Mackie, 1996; Miller & Prentice, 2016; Paluck & Shepherd, 2012; Pool & Schwegler, 2007; Tankard & Paluck, 2016; Yamin et al., 2019).

An example of this is the solid and empirically testable definition that Cristina Bicchieri (2006, p. 11) has offered, and which she has recently complemented with a general framework to diagnose and measure social norms (Bicchieri, 2017, p. 1-49; Bicchieri, Lindemans, & Jiang, 2014). According to Bicchieri (2006, p. 11), for a social norm to exist around a collective practice it must fulfil certain conditions (see Diagram 1 below): first, (1) a person has to know that a certain rule applies to a certain situation and then, (2) the person has to be willing to conform to that rule in that situation if (2a) they believe that a sufficient number of people conform to that rule and (2b) that a sufficient number of people expects them to comply with the rule (and -2b'- might even be prepared to sanction behaviour if they don't). The following diagram (1) summarizes this definition that Bicchieri (2006, p. 11) proposes, which is very similar (with some subtle differences) to the one given by Lewis (1969, p. 58) to conventions⁶:

⁵ To mention a few, different authors have argued that its definition is too general, contradictory and problematic to be empirically tested (see Bell & Cox, 2016; Cialdini et al., 1990b; Hechter & Opp, 2001, p. xi; Lapinski & Rimal, 2005). There is also evidence of interventions that have not been effective immediately (Bühler et al., 2017; DeJong et al., 2006; Miller & Prentice, 2016; Russell et al., 2005) or over time (Rachlinski, 2000), where norm change and behavioural change happened independently (Bewick et al., 2008; Miller & Prentice, 2016; Schroeder & Prentice, 1998), or that had boomerang effects (Cialdini et al., 2006; Goldstein et al., 2008) or show “extreme individual differences” (Asch, 1952, p. 457).

⁶ Namely, “A regularity R in the behaviour of members of a population P when they are agents in a recurrent situation S is a convention if and only if it is true that, and it is common knowledge in P that, in any instance of S among members of P, (1) everyone conforms to R; (2) everyone expects everyone else to conform to R; (3) everyone prefers to conform to R on condition that the others do, since S is a

Diagram 1. “Conditions for a social norm to exist” in Bicchieri (2006, p. 11)



Based on this definition, Bicchieri (Bicchieri, 2017, pp. 1–49; Bicchieri et al., 2014) also offers a conceptual framework and a diagnostic process to distinguish collective practices that are based on social norms from those that are based on descriptive norms, customs, shared moral or personal rules, and legal injunctions⁷.

The concept of social norms in four popular theoretical frameworks in psychology

There are many theories that explore the role of social norms as one of the main factors to understand behaviour and behavioural change. In the list of 138 theories identified above as influential, some of the most popular that do so (see Darnton, 2008b, pp. 15–18) include the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975, p. 401) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991), the Focus Theory of Normative Conduct (Cialdini et al., 1990), the Social Identity (Tajfel & Turner, 1979; Terry et al., 2000) and the Self-Categorization theories (Turner, 1987), and also the Theory of Normative Social Behaviour (TNSB) (Lapinski & Rimal, 2005; Rimal et

coordination problem and uniform conformity to *R* is a coordination equilibrium in *S*” (Lewis, 1969, p. 58).

⁷ While social norms comply with conditions 1, 2, 2a, and either 2b or 2b', these other collective practices comply only with some of those conditions.

al., 2005). Briefly exploring some of the main characteristics of the social norm concept in those frameworks can be useful to better understand their particularities, potential and evolution.

These theories explore different factors to explain the relationship between social norms and behaviour. As referenced by Darnton (2008c), both the Theory of Reasoned Action and the Theory of Planned Behaviour (Ajzen, 1991; Fishbein & Ajzen, 1975, p. 401) include the concept of “subjective norms”, which are made of the beliefs and perceptions people have about what others think they should or should not do. In the TRA and TPB models, the subjective norms and the attitudes people have towards a specific behaviour predict their intentions to engage in it.

In the Focus Theory of Normative Conduct (as discussed below in more detail), Cialdini and colleagues (Cialdini et al., 1990) argue that social norms not only describe beliefs about what others think people should or should not do (which they call injunctive norms), but also about what they think is the typical behaviour of a group (called descriptive norms). Furthermore, they also show empirically how the effects of social norms on behaviour are not uniformly determined by these beliefs, but they rather depend on the attention that people are paying to normative considerations in the specific situation.

Other theories have focused on how compliance with social norms depends on the sense of identity of people (Tajfel & Turner, 1979; Terry et al., 2000), and on how they self-categorize into certain groups (Turner, 1987). According to the Social Identity Theory and the Self Categorization Theory (Tajfel & Turner, 1979; Terry et al., 2000; Turner, 1987) people self-categorize and evaluate themselves as part of the groups that are psychologically relevant to them, and which causes them to “think, feel, behave, and define themselves in terms of group norms rather than unique properties of the self” (Terry et al., 2000, p. 72). When social identity associated with these groups is salient, then, people follow norms not because others are watching or because they seek social approval, but rather because “norms prescribe the context-specific attitudes and behaviours appropriate for group members” (Terry et al., 2000, p. 72).

Also, building on both the distinction between descriptive and injunctive norms and on the importance of identity, the Theory of Normative Social Behaviour (Lapinski & Rimal, 2005; Rimal et al., 2005) describes how the expectations we have about an intended outcome, our group identity, and how connected is our self-concept to our position on a particular issue, can all also influence the relationship between descriptive norms and individual behaviour. Lapinski and Rimal (2005) argue for the importance of considering these factors, as well as the communication processes involved and the attributes of the target behaviours, to understand and eventually change behaviour.

Main psychological research areas on the influence of social norms on behaviour

Research in psychology, behavioural sciences and other disciplines has also explored extensively the potential of using interventions based on social norms to transform behaviour in real-world settings (see John, Sanders, & Wang, 2014; Miller & Prentice, 2016 and Tankard & Paluck, 2016 for reviews). These studies have identified a wide variety of general topics of enquiry and moderators that influence the potential of social norms to change behaviour, and which are related both to their characteristics and to the contexts in which they are embedded. These topics and their findings are far from homogenous. Because social norms are defined and approached differently by different researchers and disciplines, areas of disagreement and conflicting findings are common (Legros & Cislighi, 2020). According to Legros and Cislighi (2020), major disagreements exist in the social norm literature about how social norms affect behaviour, including whether this happens through a single or multiple pathways, and whether it happens directly (when social norms are enough by themselves to affect behaviour) or indirectly (when it intersects with other factors). According to the authors' review, disagreements also extend to the specific paths through which norms affect behaviour, especially in respect to how norms provide value-neutral information and how they create external or become internal obligations.

But despite such fundamental disagreements, several areas of enquiry provide important distinctions and findings as well. Some of the most important for our purposes and for the psychological and behavioural literature include:

i. Characteristics of social norms and behaviours

- a. The distinction between *informational* social influence** (called descriptive norms in Cialdini et al.'s Focus Theory, 1990 and in Bicchieri, 2006, p. 11) **and *normative* social influence** (called subjective norms in the Theory of Reasoned Action of Fishbein & Ajzen, 1975, p. 401, as social norms in Bicchieri, 2006, p. 11, and as injunctive norms in Cialdini et al., 1990; see also Aarts & Dijksterhuis, 2003 and Rimal, Lapinski, Cook, & Real, 2005, for further details). While the former refers to what I perceive to be typical behaviour in a situation (Tankard & Paluck, 2016; what most people do in Cialdini et al., 1990 and containing only empirical expectations according to Bicchieri, 2006, p. 11), the latter refers to what I perceive to be desirable behaviour (what most people *ought* to do in Cialdini et al., 1990 and containing both empirical and normative expectations, Bicchieri, 2006, p. 11).

Several studies have explored the relationship between these two types of norms. There is evidence of descriptive norms having heterogeneous effects depending on the initial levels of the target behaviour, with “boomerang effects” documented in some cases (Allcott, 2011; Goldstein et al., 2008; Patrick et al., 2014; Schultz, 1999). This has been successfully counteracted by adding injunctive elements to the messages, especially those reinforcing the desirable behaviours (Nolan et al., 2008). There is also evidence of descriptive norms being more effective when describing the high, rather than the low, prevalence of a target behaviour when the behaviour is infrequent (Gerber & Rogers, 2009). Injunctive norms, on the other hand, seem to be more effective when formulated in a positive manner (i.e. “people think you should do X”) in contexts where descriptive norms are weak (Mabry & Turner, 2016).

- b. The perceptions we have of social norms and the sources we use to gather normative information about them** (Lapinski & Rimal, 2005; Miller & Prentice, 2016; Prentice & Miller, 1993; Tankard & Paluck, 2016). For Tankard & Paluck (2016), psychologists are concerned, more than with the actual rates of behaviour of a population (which are more the interest of policymakers), with the “community members’ subjective perceptions of the norm” (Tankard & Paluck, 2016, p. 181). These perceptions “become a reality and a guide for their own behavior, even when the perceptions are inaccurate” (Tankard & Paluck, 2016, p. 183). Prentice & Miller (1993) have also shown how, in practice, a social norm can still prevail and influence behaviour even when it is believed to be unpopular and dysfunctional (a phenomenon known as *pluralistic ignorance*). Tankard & Paluck (2016) distinguish three main sources that individuals use to gather normative information: individual behaviour, group summary information, and institutional signals.

In this respect, there is evidence supporting the idea that interventions based only on giving normative information can be ineffective to change behaviour (Glassman et al., 2010; Harries et al., 2013; Johnson et al., 2015; Scholly et al., 2005), and even that message content or quantity of information can be unrelated to the effectiveness of social norm interventions (Lapinski et al., 2013). Meanwhile, making people conscious about the frequency in which they engage in a behaviour and providing feedback about it (Bewick et al., 2010; Bewick, Trusler, Mulhern, Barkham, & Hill, 2008), as well as combining normative information with other

change tools (such as awareness of the problem, tools for action and prevention and a written promise), have both proven to be effective (Elias-Lambert & Black, 2016).

c. **The homogeneity, strenght and stability of social norms, and the privacy and ambiguity of the behaviours.** When attempting to understand and change social norms, researchers have emphasised the importance of considering and measuring different attributes of social norms. Dolcini et al. (2013) and Paluck & Ball (2010) define some of these attributes, including:

- Norm homogeneity or dispersion, which “reflects the extent to which reference group members hold similar normative expectations” (Dolcini et al., 2013, p. 32), or “how uniformly the group conforms to the norm” (Paluck & Ball, 2010, p. 11)
- Norm strength or central tendency, which “reflects the intensity with which members adhere to normative positions” (Dolcini et al., 2013, p. 32) often in different locations or among different groups (Paluck & Ball, 2010)
- Norm stability, which “reflects the extent to which norm homogeneity and strength remain constant over time” (Dolcini et al., 2013, p. 33), either by changes in the norms themselves or in the composition of groups

Dolcini et al. (2013) also show how these properties can be different for different clusters of the target population (for example, depending on their gender, age or socio-economic level), thus justifying differential interventions and results for each one of them. The authors predict that greater norm homogeneity and strength should be related to greater behavioural conformity to norms.

In addition to that, Lapinski & Rimal (2005) also underline how the influence of norms over behaviours can be influenced by basic attributes of those behaviours, such as how private it is (whether it is enacted in front of other people or not, and who are these people), or how ambiguous is the situation in terms of the behaviours that are considered appropriate in it (for example, unfamiliar situations where there aren't clear indications of how to act are more ambiguous).

ii. **The relationship of social norms and behaviours with the context**

d. **Social norms are context-dependent, situational and require a focus of our attention to affect behaviour** (Aarts & Dijksterhuis, 2003; Bicchieri, 2006, p. 11;

Cialdini et al., 1990; Lahlou, 2015, p. 2; Tankard & Paluck, 2016). Different researchers (see Cialdini, Demaine, Sagarin, Barrett, & Winter, 2006; Cialdini et al., 1990; Goldstein et al., 2008; Nolan et al., 2008) have presented evidence about how the influence of both descriptive and injunctive norms on behaviour is not uniform in terms of context or time. Rather, “norms should motivate behaviour primarily when they are activated (i.e. made salient or otherwise focused on)” (R. B. Cialdini et al., 1990, p. 1015). Similarly, Aarts & Dijksterhuis (2003) explore the concept of situational norms, showing that certain environments can automatically activate normative behaviour, especially when (i) goals to visit the environment are active and (ii) strong associations between environment and normative behaviour are established.

- e. **The reference groups and individuals we take into account to interpret social norms** (Abramsky et al., 2014; Cummings et al., 2013; Paluck & Shepherd, 2012; Valente & Pumpuang, 2007), the networks that organize them (Hunter et al., 2015; Paluck & Shepherd, 2012) and our sense of identity in relation to those groups (Tajfel & Turner, 1979, p. 40; Terry, Hogg, & White, 2000, p. 67). When we pay attention to certain social norms, we often do so in relation to specific groups (called reference groups in the literature) or to specific individuals (called social referents) that we think engage in and/or approve a certain behaviour (for example, depending on the behaviour, our friends, our parents, our co-workers, or our neighbours – see Abramsky et al., 2014; Cummings et al., 2013; Paluck & Shepherd, 2012; Valente & Pumpuang, 2007). These reference actors are seen alternatively in the literature, as Legros and Cislighi (2020) identify, as those who comply with the law (norm targets), as those who exert influence over the norm’s evolution (norm drivers) and those who are affected by the norm even if they’re not targets nor influencers (norm beneficiaries and victims).

And indeed, social norm interventions have shown to be more effective when they involve local promoters (Abramsky et al., 2014; Cummings et al., 2013), high-profile messengers (Hallsworth et al., 2016), friends (Dolcini et al., 2008), role-models (Haylock et al., 2016), in-groups (Reynolds et al., 2015), outgroups (Prentice & Miller, 1993), and geographically and demographically close individuals (Henry, 2010). Because of this, the particular ways in which individuals in a group interact with each other and the mutual links they hold, as well as how these individuals and connections change over time, determine the dispersion of social norms in a

population and their potential for change (Davis et al., 2015; Knopf et al., 2014). Often, these connections between individuals can be based on physical closeness, closeness based on identity (such as shared values and norms), and closeness based on multiple factors (for example nationality and work area) (see Darnton, 2008b, p. 46). Interventions that only target the “highly connected and chronically salient actors in a group” (Paluck & Shepherd, 2012, p. 899), that is the social referents, have been shown to be effective to change the social norms and behaviours of the whole group, especially when the interactions between people were “personally initiated” rather than in “arbitrary institutional channels” - Paluck & Shepherd, 2012, p. 899).

- f. **The feedback and “feed-forward” processes we use to enforce them** (Lahlou, 2017, p. 121; Mackie et al., 2015; Mockus, 2002) and how we compare ourselves to other people (Festinger, 1954). Frequently, social norms are enforced by other people and even objects by giving information of the set of appropriate behaviours in specific situations. This information can be positive or negative, and it can be given in a variety of ways after performing the behaviour (as feedback), or even before (feed-forward) (Lahlou, 2016, p. 255). Normative feedback and feed-forward processes are widely used in behavioural change interventions (see Darnton, 2008b), and there is evidence that continuous measurement and feedback can increase the effectiveness of behavioural change interventions in general (Davis et al., 2015).

Indeed, one of the most popular trends in behavioural change interventions based on social norms is the Personalized Normative Feedback –PNF (Miller & Prentice, 2016) approach. In this approach, participants are typically asked to answer questions about their own perceptions of social norms and their own behaviour. They are then given feedback on the discrepancies between those perceptions and the actual behaviours of the group and the social norms they hold, thus “correcting” the participant’s perceptions. This approach has often been used to reduce (rather than prevent – see Henry & Chan, 2010) alcohol consumption in university campuses (by showing participants that people drink less and consider acceptable to drink less than they thought – see Miller & Prentice, 2016).

- g. **The interconnections and “spillover” effects of targeted social norms and behaviours to other related social norms and behaviours** (Dolan & Galizzi, 2015; Dolcini et al., 2013). Dolcini et al. (2013) underline that behaviours are often

governed by “inter-related normative sets”, and that many interventions are ineffective because they only target part of this set or target behaviours that although related, they’re not direct outcomes of them. In a related perspective, Dolan & Galizzi (2015) propose a conceptual framework to account for behavioural spillovers that happen between two sequential behaviours when the first is the target of an intervention and the second isn’t. Their framework distinguishes between promoting, permitting, and purging behavioural spillovers, of which they describe many types.

- h. The interaction of social norms with legal and moral (or personal) regulatory systems** (Elster, 2010, p. 104; García, 2012, p. 40; Mackie, 2017; Mackie et al., 2015; Mockus, 2002, 2017; Mockus et al., 2012; Schwartz & Fleishman, 1978; Sommer, 2006, pp. 1–28). To account for the norms that have already been internalized and respond not to social but to personal expectations (like a sense of moral obligation and alignment with self-concepts), Schwartz & Fleishman (1978) have proposed the concept of personal norms. Personal norms are those that have already been internalized and respond to personal, rather than social expectations (Schwartz & Fleishman, 1978). These are akin to a sense of moral obligation, or alignment with one’s self-concept. As discussed before in relation to Bicchieri (2006, p. 11), the existence of a personal norm around a collective practice is one of the conditions for a social norm to exist, but not the only one. According to her definition, when people recognize that there is a rule that applies to a certain situation and decide to follow it (regardless of the expectations of others), then a personal norm is at play (but not necessarily a social one). When people decide to follow a rule on the condition that they believe that it is typical and desirable to others, then it’s also a descriptive or social norm.

According to Mockus (2002), behaviours are often the result of an interaction between motivations linked to reasons, emotions and interests, on the one hand, and regulatory systems linked to legal, social and moral norms on the other. These motivations and regulatory systems can often be at odds, offering an explanation on why people engage in certain behaviours even when they know it’s against the law and/or it’s morally unacceptable: in some contexts, engaging in that behaviour can be perceived as being typical and/or desirable for a certain group (social norms). Because of this, considering the legal and moral norms at play in a specific context can be essential to improve social norm interventions, and to boost their

effects and sustainability. Indeed, Mackie (2017) describes a general social norm of legal obedience in which people consider typical and acceptable to follow (or not follow) the law in general, which often determines the success of legislative and policy initiatives in regulating the behaviour of people.

- i. **The role emotions play in compliance to social norms** (Elster, 1998; Mockus, 2002). Emotions are seen both as causes for adjusting our behaviour to comply with social norms (for example, when we feel guilt and anxiety at the prospect of breaking a norm, or anger when someone doesn't follow it), and also as consequences after following a norm (for example pride for complying or shame for not complying) (see Bicchieri, 2006; Elster, 1989; Mockus, 2002). As researchers have argued, deviance (or the prospect of deviance) from legal, social or personal norms can be a source of both negative and positive emotions and social consequences (Mockus, 2002; Prentice & Miller, 1993).

For Elster (1989), for example, social norms “have a grip on the mind that is due to the strong emotions they can trigger” (Elster, 1989, p. 100). As Lahlou (2017, p. 117) argues, societies often create mechanisms to provoke “disgust, shame, and other unpleasant emotions in order to create a psychological barrier” to prevent “a few individuals performing incorrect behaviour can cause considerable harm or negative externalities, for example in the case of violent or abusive behaviour”.

Together, the issues discussed in this section summarize some of the main areas of recent behavioural and psychological research into the relationship between social norms and behaviour. These areas describe processes that are transversal to the different stages of the “life cycle” of social norms, which according to Legros and Cislighi (2020) are described in the literature through the common themes of emergence, maintenance, and change and dissipation (which encompass the processes through which social norms are created, adopted, acquired and learned, as well as how they can change and disappear). Considering these stages of the evolution that social norms go through is essential to better understand the influence they can have on behaviour (specifically, the areas of research just described).

The main research areas described (*a* through *i*) are summarized in the following table (4):

Table 4. Popular topics of enquiry around social norms and behavioural change

Topics and popular focuses		Examples of authors that develop them
Characteristics of social norms and behaviours		
a. Informational versus normative social influence	Distinction between social influence linked to perceptions of typical behaviour (informational – descriptive) and those linked to perceptions of desirable behaviour (normative – injunctive)	(Bicchieri, 2006, p. 11; Cialdini et al., 1990; Fishbein & Ajzen, 1975; Rimal et al., 2005)
b. Normative perceptions and normative information	Sources of information we use to interpret social norms and the perceptions we form around them	(Miller & Prentice, 2016; Prentice & Miller, 1993; Rimal et al., 2005; Tankard & Paluck, 2016)
c. Other relevant characteristics of social norms and behaviours	Influence on behaviour of attributes of social norms (such as homogeneity, strength, and stability) and behaviours (such as privacy and ambiguity)	(Dolcini et al., 2013; Lapinski & Rimal, 2005; Paluck & Ball, 2010)
The relationship of social norms and behaviours with the context		
d. Social norms dependent on context, situation and focus of attention	Social norms as dependent on context, situation and attention focus to affect behaviour	(Aarts & Dijksterhuis, 2003; Bicchieri, 2006, p. 11; Cialdini et al., 1990; Lahlou, 2015, p. 2; Tankard & Paluck, 2016)
e. Reference groups and social networks	Reference groups and individuals, networks and identity processes linked to social norms	(Abramsky et al., 2014; Cummings et al., 2013; Davis, Heiman, & Menczer, 2015; Hunter et al., 2015; Knopf et al., 2014; Paluck & Shepherd, 2012; Tajfel & Turner, 1979, p. 40; Terry et al., 2000, p. 67; Valente & Pumpuang, 2007)
f. Feedback and feed-forward enforcement	Enforcement of social norms by giving information on the correct behaviours in a situation either before (feed-forward) or after (feedback) going through it	(Lahlou, 2017, p. 121; Mackie et al., 2015; Mockus, 2002)
g. Interconnections and spill-over effects	Interconnections and spill-over effects between the social norms and behaviours targeted by interventions and other social norms and behaviours	(Dolan & Galizzi, 2015; Dolcini et al., 2013)

Topics and popular focuses		Examples of authors that develop them
Characteristics of social norms and behaviours		
h. Articulation with legal and personal norms	Interactions of social norms and behaviours with moral (or personal) and legal norms	(Elster, 2010, p. 104; García, 2012, p. 40; Mackie, 2017; Mackie et al., 2015; Mockus, 2002, 2017; Mockus et al., 2012; Schwartz & Fleishman, 1978; Sommer, 2006, pp. 1–28)
i. The role of emotions	Influence of emotions in the relation between social norms and behaviour	(Elster, 1989; Mockus, 2002; Prentice & Miller, 1993)

Power relations and ethics in social norm interventions

An essential issue to consider in any diagnostic, intervention or evaluation process around social norms has to do with the power relations and ethical issues that are inevitably linked to them. As happens with any social construct, social norms are embedded in power relations that have concrete consequences for the members of the groups in which they operate. Social norms inevitably benefit certain groups or causes at the expense of others, and they often play an important role in sustaining the current customs, social roles, and the broader social order.

As Freire (1996, p. 27) and Boal (2000, p. 64) point out, these power relations are often mediated by *oppression*, a dehumanizing physical or symbolic violence that is exerted by individuals against each other to maintain a specific social order (Yamin, 2012). By defining the behaviours that are considered to be typical and desirable (and those that are not), social norms are often instrumental to maintaining these relations. Indeed, Foucault (Foucault, 1995, p. 184; Paternek, 1987) describes the process of normalisation (which include the formation of norms of conduct and the rewards or punishments associated with compliance to them) as one of the main forms of disciplinary power.

But at the same time, current and new social norms can also support the forces that oppose, resist, or reinterpret them. As Cislighi and Heise (2018b) show, a common pitfall in social norm interventions is “to see ‘culture’ only as a source of problems rather than as a space for possible solutions” and thus to also fail to recognize that “in any given cultural context both potentially harmful and potentially protective norms likely exist” (Cislighi & Heise, 2018b, p. 4). As de Certeau (1990, p. xlv) argues, everyday life is traversed both by the disciplinary *strategies* of scientific, political and economic rationalities that cages subjects in universal categories, and also by the *tactics* through which people make use and propose creative reinterpretations those structures.

These *tactics*, which are places of resistance and creation that overturn disciplinary measures can also be supported and work through social norms.

Because of all this, exploring, making explicit and trying to influence social norms in a given population will almost inevitably disturb local power dynamics at some level (however big or small). And as Cislighi and Heise (2020) point out, even if power relations have been more often considered in relation to gender norms (in which unequal power relations are more visible), they are essential for all types of social norms work, even when they are apparently less affected by power dynamics. To do this, no “one-size-fits-all” solution can possibly solve the complex process of “conflict and renegotiation of the power equilibrium” (Cislighi & Heise, 2020, p. 412) that normative changes imply. Rather, an approach that actively seeks to understand and engage with the power relations at work in target contexts is essential to understand the prevalence and dynamics of social norms, as well as to identify the possible sources of opposition to change (including powerholders – see Cislighi & Heise, 2020). And maybe more importantly, it might also reduce the chances of significant backlashes and even harm that can be created both when existing norms are challenged and also when new norms are emerging: for instance, “in contexts where the norm dictates that women should not work outside the home, women who challenge the norm and work for pay experience higher risk of experiencing domestic violence” (Cislighi & Heise, 2020, p. 415).

But if we recognise that social norms are often supported and support local power dynamics in a target group, then a fundamental ethical question arises for both diagnostics and intervention processes. This is because both processes, in a sense, can be considered as power dynamics in themselves in the sense that they strive to make visible the status quo and even transform it (often, as I mentioned above, to the benefit of specific sub-groups or interests). Defining who has the “right” to influence others, what changes are “necessary”, what is the “right” direction of change to be undertaken, and as an inevitable result what side of power relations will be benefited, are extremely complex and problematic issues. As mentioned above, the “do no harm” principle is a complex one to implement in this area.

Due to the powerful influence that these forces yield on people’s lives and because of the wide diversity of local particularities, defining ethical guidelines for social norm and other behavioural interventions in real-world contexts is a problematic task and should not be taken lightly. Because of this, as authors working on research ethics in complex issues and among vulnerable populations have discussed (see Everri et al., 2020; Liegl & Schindler, 2013; Schembri & Boyle, 2013), a mixed approach that is guided both by broad principles but that also engages collaboratively with local

conditions and power relations might prove beneficial. Widely accepted frameworks such as the human rights and sustainable development goals infrastructures (see Woods, 2010), as well as local laws and regulation (see Mockus, 2002, 2015), while extremely valuable, should be complemented with collaborative approaches that “include both acquiring a deep knowledge of local contexts and their intrinsic power relations [...], as well as engaging in critical dialogues with participants about potential risks and harm and how to manage them” (Everri et al., 2020). This mixed engagement should be transversal to the whole process of intervention planning, design and evaluation, including the fundamental issues outlined above around the definition of change goals and how a potential research or intervention process relies on and disturbs local power relations.

To do this, collective participation and dialogue are essential both to better understand what different change objectives and interventions procedures would imply in local contexts, and also to reach potential agreements between competing groups. Such “community discussions”, as Cislighi et al. (2019, p. 936) argue, allow “members of the same group identify local harmful practices and the norms that sustain them, eventually renegotiating both to achieve greater health, well-being, and empowerment for themselves and others in their group”.

But once the complex issue of change goals has been defined and negotiated, interventions should also consider carefully and make explicit fundamental issues relating to agency and compliance in the target population. Three are especially important: the balance between designing total freedom or total control, the provision of adequate affordances to support the target behaviours, and the danger of interventions promoting harmful consequences on non-compliers.

For the first issue, while interventions strive to be as effective as possible to promote or constraint the desired behaviour, in real-world contexts total compliance is often impossible to achieve and even dangerous to pursue. As Installation Theory (Lahlou, 2017, p. 5) shows, in order for complex societies to achieve the large-scale control and coordination processes they depend on, individual activity must be channelled in some form to produce expected behaviours. Malls, offices, roads, airports, or universities, among other installations, depend on people doing similar things when they are required to do so. But at the same time, total control by a single authority is impossible to achieve and can often backfire by ignoring the wide variety of human motives and characteristics. Part of the power of installations to ensure some degree of compliance resides precisely in the fact that control “is never total and some margin is left to the creativity of actors to play the system, as long as they stay within certain limits” (Lahlou, 2017, p. 174). From a societal perspective, social norm and behavioural interventions should strive, as most policy interventions do, to achieve a

more or less healthy (yet always problematic) balance between total freedom and total control. To do this, a useful proxy is to design interventions that increase or decrease collective trends, rather than force total compliance (e.g. “to increase the rate of people that engage in X” rather than “to ensure that 100% of the people do X”).

Linked to this idea, both practical and ethical reasons suggest that interventions should always pay attention to the support elements that people need to perform the desired behaviours or the alternatives to the undesired ones. Promoting the adoption of behaviours for which target groups or sub-groups do not have the necessary physical, psychological, or social affordances (including money, skills, or infrastructure, for example) can result in ineffective interventions, but is also dangerous because it might put excessive pressure and even social and legal sanctions on people that are not able to comply even if they wanted to. By doing so, it might even erode trust in authorities and weaken the general social norm of law compliance (Mackie, 2017). In this respect, and as we will discuss below, Installation Theory (Lahlou, 2017, p. 5) provides the arguments and techniques to both analyse and redesign the local layers of determinants that support the desired activities (but researchers and practitioners should carefully analyse and evaluate the convenience and need of providing such support).

And finally, another fundamental issue around agency and compliance is the need to prevent people to exert harmful consequences on non-compliers. Because even if social regulation and social norms owe their power to influence to the existence of social expectations and eventual sanctions (which might take social, emotional, and other forms), interventions should always examine and take adequate precautions to make sure that excessive harmful consequences (such as social isolation or violence, for example) are not imposed on people. Once again, a mixed approach that engages both with human rights principles and collaborative examinations of local issues can provide a good approximation to deal with this issue. For problematic and extreme cases (for example, when aiming to reduce illegal behaviours), research and intervention designers should remember that social regulation is only a first layer that can and should be complemented with legal regulation and sanctions as well. In such cases, mechanisms and actors involved in regular legal and administrative procedures should be involved and anticipated for (such as social and health workers, police, and so on).

In what relates to some of these power and ethics issues, Mockus’ interventions take particular stances that we will describe and discuss in the rest of this work. By doing this we do not mean they are some sort of golden standard or best practice, although they do seem to be deeply linked to their particularities and could prove useful in other contexts and interventions. But rather than

accepting and copying these blindly, both researchers and practitioners should think seriously about these issues to find the engagement that works best for the specific conditions, populations, and contexts they intend to work on.

As we will discuss below, the “pedagogical balance” (what citizens learn about collective challenges and their role in them after an intervention) and the “soft touch” (change is proposed through mockery and example rather than coercion) that seem to characterize them offer an interesting alternative to change processes based on authoritative measures. Rather than just designing change, interventions are seen as questions that are asked to society – rather than answers that must be accepted. The mime-artists in Mockus’ interventions, as we will see in Paper 2 below, do not give people orders, coerce or trick them to change: they mock and give an example for people to engage in reflections and, ideally, to identify as vigilantes. Change is not forced on them, as several unsuccessful interventions that people refused to engage with or did not understand show. The aim is to inspire people to engage in self-observation and collective action, which ideally could constitute a much more powerful motivator and create more empowering connections and learning effects than other more direct means (and with the advantage, as well, of impacting social sustainability and social capital dimensions). And while of course this philosophy is often complicated in real-world contexts and the extent to which it is expressed in actual intervention designs is open to debate, this small change in approach seems to produce significantly different interventions and narratives around them (at least judging by our own research).

2.2. A new approach to behavioural change using social norms

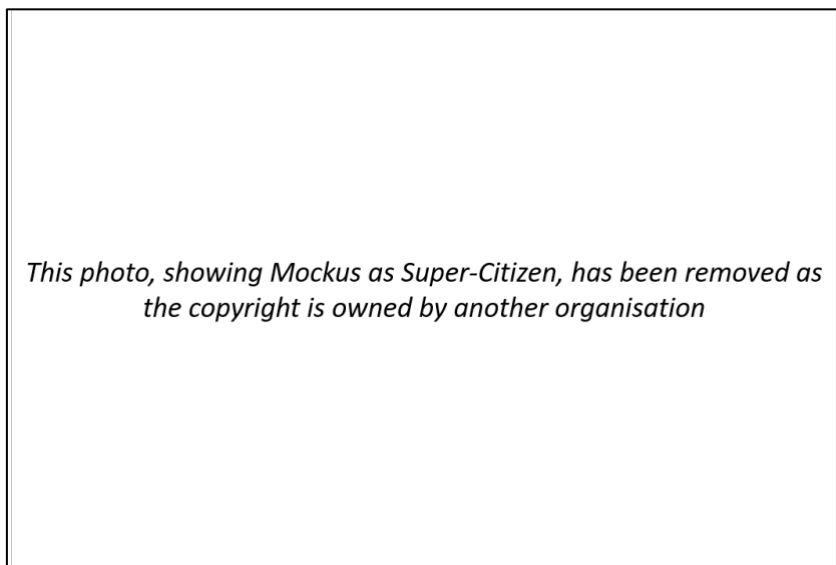
2.2.1. The Civic Culture approach of Antanas Mockus

During his time as Mayor of Bogotá in 1995-97 and 2001-03, Antanas Mockus applied several behavioural change interventions that used cultural and artistic motifs to influence social norms and foster mutual regulation (an approach known as “*cultura ciudadana*” – translated here as “civic culture” following Tognato, 2018, p. 21). These unusual interventions that included “mimes to bring order on Bogotá’s chaotic traffic, [or] so-called days of [symbolic] inoculation against violence” (Tognato, 2018) were used to complement more traditional public policies, and contributed to achieve results that are uncommon in these domains: in 11 years (from 1993 to 2004), homicides decreased by 70% (Melo, 2012, p. 89), traffic accidents by 65% (Sánchez, 2012,

p. 56), per capita water consumption by 46% (Murrain, 2012, p. 203), and over 63,000 families chose to pay a voluntary 10% extra of the taxes they owed (Mockus, 2015), to name just a few⁸.

Antanas Mockus is not just any politician (or any academic turned politician), and his unique personal story is deeply related to the creation of the concept and the application of the civic culture approach. A mathematician and philosopher trained in France and Colombia, Mockus started his career as an academic in the National University of Colombia, the most important public university in the country. Being 39 years old, he was appointed Rector, a post he was forced to leave after a scandal in which he decided to apply Bourdieu's (1990, p. 133) concept of symbolic violence by mooning⁹ an auditorium of 1,000 protesting students that would not let him speak¹⁰. After resigning, he ran and won his campaign for Mayor of the 7-million people capital of the country dressed as a superhero ("Super-citizen", a model for civic behaviour), proposing to raise taxes immediately and without having the support of any political party:

Image 1. Mockus as Super-citizen in 1994 (taken from Alexander & Stibbs, 2010)



Mockus' interventions were designed to mobilize cultural and artistic motifs (Sommer, 2006, p. 2) in order to create civic reflections around social problems and a certain collective engagement with

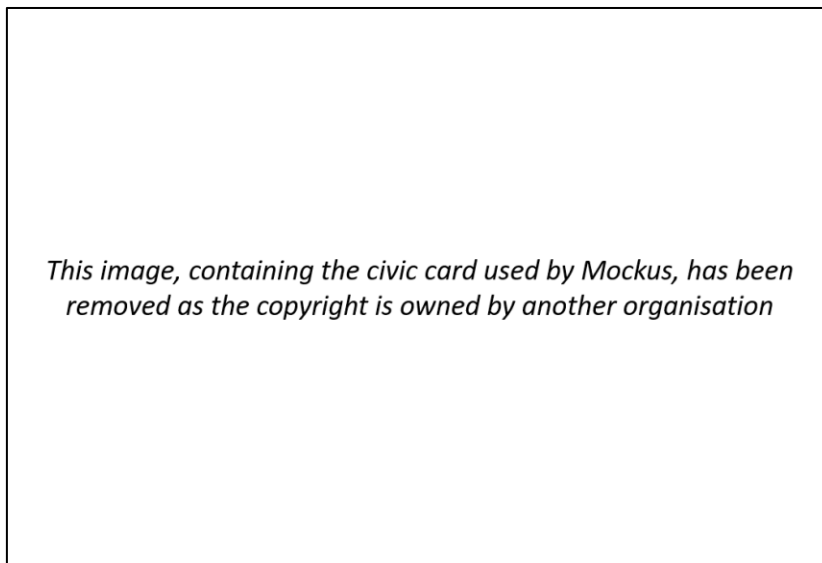
⁸ See Sommer (2006, pp. 1-28) Mockus (2002 and Mockus *et al.*, 2012), Yamin (2015) and Falconi (2017) for examples of the specific interventions performed and their results.

⁹ "Mooning is the act of displaying one's bare buttocks by removing clothing" (Wikipedia, 2017).

¹⁰ An episode he explained, as the New York Times reports, in the following way: "'Innovative behaviour can be useful when you run out of words,' Mr. Mockus said of the uproar that followed, explaining that he viewed the episode within the concept of French philosopher Pierre Bourdieu's 'symbolic violence'" (Romero, 2010).

them (Mockus, Murraín, & Villa, 2012; Yamin, 2013). They were based on the idea that art, “humour and playfulness” are the “most powerful tool[s] for change we have” (Mockus, 2015). An example of one of the simplest and most remembered interventions can help illustrate their particularities. Back in May 1995, the Mayor’s Office of Bogotá obtained support from the city’s private sector to print and distribute 1.5 million of “civic cards”. Each card had two sides, a red and a white one, which had a thumbs-up and thumbs-down sign:

Image 2. The Civic Card



Source: <https://images.app.goo.gl/UtTqi6rRuHenVrui7>

The card was presented as a mechanism to support mutual regulation between citizens in the street (by allowing them to express peacefully their dissent or encouragement to specific behaviours of others). Although never systematically evaluated, the card became widely popular in the city and its use is still remembered by its inhabitants today.

As this example shows, while also based on social norms (perceptions about typical and desirable behaviours), Mockus’ interventions differ a great deal from those that are typically applied in the academic literature (most of which are based on providing online messages with graphs and percentages about what others are doing or their opinions - see Study 1 and Cialdini et al., 1990; Goldstein et al., 2008; or Prentice & Miller, 1993, for examples). In contrast, Mockus’ interventions

are based on more complex practices that seek to create civic reflections and mutual regulation. This is done by creating what Debord (1961) calls *situations*, which are deliberately created conditions that introduce an element of strangeness in everyday life (Highmore, 2002, p. 2), and that in this way change perceptions through its denaturalization and reinterpretation (Shklovsky, 1965, p. 3). Interestingly, Mockus' interventions have a 'public' aspect in many senses of the term: they are designed for an audience (the public), they take place in public places, and they are directed towards the public good. These aspects all leverage social norms by making salient the presence of "others" and making explicit, displaying and provoking moral evaluations of their actions.

By exposing collective consensuses (Paluck & Shepherd, 2012) that are currently operating or that express an ideal future state, social norms can increase public awareness and engagement with collective problems. Because of this, when rightly applied, interventions based on social norms can foster the "helping relationship" described by Schein (1999, p. 30), in which consultants set up and monitor the processes that allow clients to solve their own problems. For administrations, consultants, or social leaders, this means the possibility of introducing transformations in larger scales at lower costs (because transformations and their regulation become distributed and are performed by the users themselves through mutual regulation).

But while these interventions and the reasons for their success have been studied from a variety of disciplines that include cultural and art theory, sociology, philosophy and public policy¹¹ (see Elster, 2010, p. 104; Mackie, 2017; Sommer, 2006, p. 2; Tognato, 2017; Yamin, 2012), research into the psychological factors associated with them has not been undertaken yet and could prove essential to understand their efficacy in transforming behaviour. To this end, a critical component is to compare the particularities of Mockus' interventions (and the power they seem to have to produce large-scale transformations), with the literature on behavioural change interventions based on social norms in real-world contexts. Because an exhaustive exploration of such particularities exceeded by far the resources available for this project, we decided to focus on three critical factors that seem to hold a great potential (as argued in Lahlou, 2017, p. 140; Tognato, 2017; and Yamin, 2012) and that have clear developments in the psychological literature:

¹¹ The NGO *Corpovisionarios* conducts the regular application of the "Civic Culture Survey" (Murrain, 2012, p. 203) that is representative for whole cities as a way of measuring the changes in perceptions and attitudes of their inhabitants (including those that are being intervened). These measurements are quite informative and useful to measure chronological and geographic variations in perceptions and attitudes towards hypothetical and self-reported situations. Nevertheless, a closer study of the psychological factor associated with specific interventions and the narratives that emerge from them is crucial to understand their broader efficacy, especially taking into account the problems associated with the Value Action gap (Blake, 1999).

- The wide range of practical intervention strategies and mechanisms that Mockus' interventions seem to apply directly in the context where the target behaviour and social interactions happen (as referenced in this section).
- The use of the three layers of local determinants of behaviour in local contexts described by Installation Theory (Lahlou, 2017, p. 5, see section 2.2.2 below).
- The use of narratives through which participants and other key policy actors interpret and disseminate intervention messages (Brinberg & Hamby, 2012; Hamby, Brinberg, & Jaccard, 2016, see section 2.2.3 below).

The importance of these three characteristics stems from the idea that one of the main reasons why Mockus' interventions have been so effective to transform behaviour, is because they apply a wide range of creative intervention strategies and mechanisms directly in the contexts and the social interaction processes in which the target behaviour happens in order to reconfigure the three layers of local installations (Lahlou, 2017, p. 82-144) in a way that creates appealing and unusual narratives (Brinberg & Hamby, 2012; Debord, 1961; Hamby et al., 2016; Shklovsky, 1965, p. 3) that enact social-normative messages (Tankard & Paluck, 2016).

To illustrate this, let's consider a programme applied by Mockus' NGO against domestic violence (see Yamin, 2012). In it, 20,000 "whistles against abuse" were distributed in a small city with the following instruction: "if you see or hear a woman being abused, please use this whistle three times. When you hear three whistles, a woman is being abused: please use it as well. Don't be indifferent" (Ariza & Chiappe, 2012, p. 182). In this intervention, the "whistle" leverages elements of the three layers that creates narratives (stories of strange events that are told and retold): it is a material object (physical layer), I can reach it to and use when needed (through an embodied competence in the psychological layer), and its use communicates publicly how in this town we no longer consider acceptable such behaviours and some of us are ready to act upon it (social layer – social norms). Because of how the intervention was crafted, entertaining anecdotes (narratives) about specific situations in which the whistle was used and the reactions it fostered became a common subject in social gatherings (Yamin, 2012), thus further disseminating and enforcing the normative message behind it.

In order to provide further clarity to readers, the following table summarizes the main theoretical frameworks and concepts that will be used in this work to conceptualize Mockus' interventions:

Table 5. Summary of main theoretical framework and concepts

Theoretical frameworks	Relevant concepts and references	Importance to understand Mockus' interventions in this work
Theories, models, and techniques of behavioural change (section 2.1.1.)	<ul style="list-style-type: none"> - Concepts to classify models and theories of behaviour (adapted from (Darnton, 2008a) - Behavioural change techniques in social norm interventions (Bicchieri, 2017; Miller & Prentice, 2016; Paluck, 2009b) 	Provides the general background in which the main topics and theoretical frameworks of this project are inserted in (including Installation Theory and social norms)
Social norms and behaviour (section 2.1.2.)	<ul style="list-style-type: none"> - Definition of social norms (Bicchieri, 2006, 2017; Cialdini et al., 1990; Tankard & Paluck, 2016) - Social-norm theories and areas of enquiry (Legros & Cislighi, 2020) - The importance of the context and the sources of normative information (Cialdini et al., 1990; Lahlou, 2017; Tankard & Paluck, 2016) 	<p>Constitutes the main body of literature addressed in this project, and provides a general framework to conceptualize the specific aspects of human behaviour and behavioural change that are of interest to it (specifically, those related to social influence processes)</p> <p>Provides a conceptualization of social influence processes behind Mockus' interventions</p> <p>Provides insights and techniques for normative and behavioural change, and how Mockus' interventions leverage them</p>
Installation theory (section 2.2.2.)	<ul style="list-style-type: none"> - Human behaviour and the reproduction of society (Lahlou, 2015, 2017) - Three layers of local determinants of behaviour (Lahlou, 2015, 2017) - Redesign of Installations as behavioural intervention (Lahlou, 2015; Lahlou, Boesen-Mariani, et al., 2015; Lahlou, 2017) 	<p>Provides a general framework to conceptualize human behaviour and behavioural change (both through and beyond social influence)</p> <p>Provides an integral conceptualization of the main types of elements to understand and change behaviour in real world contexts, and how Mockus' interventions leverage them</p>
Civic culture and cultural agency (section 2.2.1.)	<ul style="list-style-type: none"> - Civic culture framework (Mackie, 2017; Mockus, 2002, 2015; Tognato, 2017) - Cultural agency and cultural change (Sommer, 2006) 	Constitutes the main frameworks through which Mockus' interventions have been created and interpreted so far
Drama and social change (section 2.2.3.)	<ul style="list-style-type: none"> - Anthropology of drama and ritual (Geertz, 1973, 2013; Morgan & Brask, 1988; Turner, 2001) - Theatre of the Oppressed (Boal, 1995, 2000) - Dramatic theory (Branaman, 2013; Brecht & Bentley, 1961; Burke, 1945) 	<p>Provides a conceptualization of how Mockus' interventions leverage elements of drama and ritual</p> <p>Contribute to a new interpretation of the dynamics fuelling Mockus' interventions</p>
Narrative persuasion and policy narratives (section 2.2.3.)	<ul style="list-style-type: none"> - Narrative psychology (Barthes, 1993; Bruner, 1986, 1991; László et al., 2002) - Narrative persuasion (Brinberg & Hamby, 2012; Green & Brock, 2002; Hamby, Brinberg, & 	<p>Provides a conceptualization of the role of narratives in Mockus' interventions</p> <p>Contribute to a new interpretation of the dynamics fuelling Mockus' interventions</p>

Theoretical frameworks	Relevant concepts and references	Importance to understand Mockus' interventions in this work
	Daniloski, 2016; Hamby, Brinberg, & Jaccard, 2016)	
	- Narrative Policy Framework (McBeth & Jones, 2010; Shanahan et al., 2011, 2018)	

2.2.2. Installations and local determinants of behaviour

According to Installation Theory (Lahlou, 2009, 2015, 2017, p.140), the world around us is made of installations, which are “specific, local, societal settings where humans are expected to behave in a predictable way” (Lahlou, 2017, p. 140). Classrooms, restaurants, or the cabin of a truck are all examples of installations, that “must be understood [...] in the artistic sense of assembling patterns in space and time to modify the way we experience this situation” (Lahlou, 2015, p. 5). They are intentionally designed and can be conceptualized as “natural behavioural unit[s]” because they are “spontaneously identified as such by members of a culture, socialized from childhood, who thus ‘naturally’ know what to do in them” (Lahlou, 2017, p. 3).

Each installation is composed of three layers that come together locally to produce different activities: the objective physical environment, the embodied interpretive systems, and social regulation. Together, the three layers support the process through which “individual needs, desires and will combine with the reality of the context to produce a behavioural outcome” (Lahlou, 2017, p. 82). This process is repeated continuously, and because of this, the endurance and the potential of reconfiguration of installations “is not the result of passive inertia, but rather of continuous reconstruction” (Lahlou, 2017, p. 146) through a dual selection process in the symbolic and empirical realms (Lahlou, 2015). Societies, then, do not “reproduce as a whole, as an organism, as a structure, but *point by point*, locally, and at different local pace” (Lahlou, 2017, p. 231).

Social norms (see section 2.1.2 above), are part of the third layer of installations, social regulation, where “other stakeholders regulate our activity” (Lahlou, 2017, p. 105) directly or indirectly. The social regulation layer, according to Lahlou (2017, p. 105) works through communities (as groups with common interests), organizations (as goals that organize people around them) and institutions (as a set of behavioural rules, for example the institution of marriage). And while social norms are part of the social layer, they are also enacted and enforced through the other two layers: the physical affordances we encounter and our embodied competences. The behaviours that are

considered wrong or right in specific situations are enforced by other people and even objects by supporting and restricting behaviours, as well as by giving information or requiring certain skills.

Since behaviours are determined locally together by the three layers, the interventions that seek to transform those behaviours cannot expect strong and durable effects by modifying only one of the layers, or trying to influence behaviour away from its time and place of delivery. Unfortunately, this is the case with many interventions: they focus *partially* on the physical (such as design-centred approaches and certain nudging techniques, see Sunstein, 2016), on the psychological (such as training programmes and those based on attitudes and beliefs only, see Ajzen & Fishbein, 1980, p. 5 or de Leeuw, Valois, & Seixas, 2014) or on the social layer (such as many of the social norm interventions that are limited to providing normative information and/or feedback, see Miller & Prentice, 2013, p. 799). Others focus on limited aspects of these layers or ignore their local and situated dimensions altogether to concentrate on remote interventions (see Paper 1).

This idea is also consistent with frameworks in the social norm literature that argue for a “wider awareness of how other institutional, material, individual and social factors” (Cislaghi & Heise, 2019, p. 616) affect target behaviours in interventions. Cislaghi and Heise’s (2019) Dynamic Framework for Social Change (designed for health promotion through social norms in low-income countries), for example, defines four domains of influence that include the material, the individual, the institutional, and the social (which can all be linked to physical, psychological and social layers). As Installation Theory also recognizes, “these domains overlap generating cross-cutting factors that also contribute to influencing people’s actions” (Cislaghi & Heise, 2019, p. 618).

A central prediction of Installation Theory regarding behavioural change interventions is that to be truly effective and sustainable in transforming behavioural outcomes, redesign and intervention processes must be undertaken in the three layers and their interconnections. For example, a field experiment by Lahlou et al. (2015) to increase water intake of children, redesigned the three layers of installations and achieved an increase of 219-567% in the target behaviour, with much larger effects when applying redesigns in the three layers than when applying them in only two of them. And precisely, as argued by Lahlou, the interventions applied by Mockus and discussed in section 2.2.1, were also “direct interventions in installations to change the way they operate by addressing various layers, and therefore making participants experience another use” (Lahlou, 2017, p. 314).

Installation Theory also includes a general framework to analyse and redesign installations in order to achieve sustainable behavioural changes. Subjective Evidence Based Ethnography (SEBE – see Lahlou, Bellu, & Boesen-Mariani, 2015) is a research method that is especially suited to collect this kind of information. Relying on a miniature camera which is worn at eye level by the users of

specific installations, SEBE uses First Person Perspective –FPP digital recordings and Replay Interviews –RIW with users based on these recordings to access activities, which consist on both overt behaviours (through the video recordings) and covert behaviours, or the “emotions, goals, motivations, interpretation, intentions and more generally psychological processes” (Lahlou, Le Bellu, et al., 2015). Using a variation of Russian Activity Theory (Lahlou et al., 2012), Installation Theory focuses on how different variants and segments of activities and their associated sub goals are performed in local installations and on the relevant elements of the three layers involved in the activity. Once identified (especially for segments of the activity that are difficult or uncomfortable in the current configuration), behaviours can be transformed sustainably by reconfiguring specific aspects of the three layers of the installation, “taking into account opportunity windows and costs, but also the potential undesired effects which each level of intervention may bring along” (Lahlou, 2017, p. 314).

2.2.3. Narratives, drama and policy interventions

Good interventions create stories. Watching a sign that reads “please use the zebra crossing” is not the same as being mocked by a mime-artists for crossing the street at the wrong place, or hearing that the Mayor decided to regulate traffic using mime-artists instead of policemen. Because good narratives make good tokens of conversation, they are transmitted from peer to peer and therefore travel a long way through social networks (offline or online). And since particularity and breaches of norms are important features of narratives¹² (Bruner, 1991), the mime-artist interventions are much more likely to create stories that are widely disseminated by being told over and over. Indeed, “people who seek either personal or community change often find that it is very difficult to sustain change without the support of a collectivity that provides a new communal narrative around which they can sustain changes in their own personal story” (Rappaport, 1995, p. 796).

Narrative accounts, or stories, are an important part of the way we understand the world and communicate with others (Bruner, 1986, p. 11; László, Behmann, Péley, & Pólya, 2002, p. 9): “we organize our experience and our memory of human happenings mainly in the form of narrative – stories, excuses, myths, reasons for doing and not doing, and so on” (Bruner, 1991, p. 4). Narrative

¹² Bruner (1991) defines ten features of narrative thinking, including (1) diacronicity, (2) particularity, (3) intentional state entailment, (4) hermeneutic composability, (5) canonicity and breach, (6) referentiality, (7) genericness, (8) normativeness, (9) context sensitivity and negotiability and (10) narrative accrual. Especially useful for this work is his insistence on how narratives are based on an interplay between the canonical, conventional expectations, norms or cultural legitimacy, and their breaches (especially in features 2, 5, 6 and 8).

can be defined as “the representation of an event or a series of events” (Abbott, 2015, p. 13), and it “is present in every age, in every place, in every society; it begins with the very history of mankind and there nowhere is nor has been a people without narrative” (Barthes, 1993, pp. 251–252).

Narratives allow us to organize, communicate and collect experiences. But because of our capacity to engage in “cooperative activity, through which the recipient extracts from the text what the text does not say (but rather presupposes, promises, misses and logically implies)” (Eco, 1993, p. 13, *translation mine*) narrative is also so much more. Just as with fairy tales in a child, compelling narratives “must stimulate his imagination; help him to develop his intellect and clarify his emotions; be attuned to his anxieties and aspirations; give full recognition to his difficulties, while at the same time suggesting solutions to the problems which perturb him” (Bettelheim, 1991, p. 5). From the actual text of the narrative (or its lineal manifestation), the circumstances of enunciation and the codes and sub codes we have learnt allow us to update its contents to interpret and reinterpret it (Eco, 1993, p. 103). Eco describes the “cooperative movements” (Eco, 1993, p. 103) through which readers achieve this, dividing them between its expressions (made of codes and circumstances), intentions (the different structures in it) and extensions (references to different worlds) of the text.

In psychology, narrative has been explored both as a form of communication and of basic cognitive functioning (Bruner, 1986, p. 11; László et al., 2002, p. 9). A growing research trend based mainly on those ideas (and called narrative psychology by some, see László et al., 2002, p. 9), has started to explore how narratives structure and are structured by classic social psychological subjects of enquiry, including cognition (Graesser et al., 2002), identity (McAdams, 1988, p. 31), core beliefs and self-image (Kenthirarajah & Walton, 2015), social representations (Jovchelovitch, 2002, p. 47; László, 2002, p. 28), and influence or persuasion (Brinberg & Hamby, 2012; Green & Brock, 2002, p. 315; Hamby, Brinberg, & Jaccard, 2016; Slater & Rouner, 2002; Strange, 2002, p. 263).

According to Bruner (1986, p. 11; László et al., 2002, p. 9), as opposed to paradigmatic or logico-scientific modes of thinking which are based mainly on conceptualization, categorization and logic, narrative modes of thinking construct psychological landscapes of action (containing aspects such as the agents and goals of a story) and consciousness (including aspects such as how those agents feel or what they know). Because of this, narratives are more concerned with lifelikeness and verisimilitude than universal truths (Bruner, 1986, p. 11; László et al., 2002, p. 9), linking the self and the world in a process where “narrative imitates life, [and] life imitates narrative” (Bruner, 1987, p. 12). Bruner (1991, p. 18) also insists on how “narratives do accrue, and, as anthropologists insist, the accruals eventually create something variously called a ‘culture’, or a ‘history’ or, more loosely, a ‘tradition’”.

Drama and social change

But why are Mockus' narratives so powerful to capture the imagination of people (see study 2)? What makes them so special compared to the ones created around other policies and behavioural change initiatives? A possible answer might reside in the notion of drama.

Drama, according to Aristotle (2013, p. 17), is one of the modes in which poetry represents the actions of people. A long tradition of philosophers, anthropologists and historians (including Aristotle himself, see Aristotle, 2013), argue that theatre emerged from communal rituals, and that they both represented cultural symbols and fulfilled a function of social control and integration (Morgan & Brask, 1988, p. 175). Dramas and rituals, as Geertz (1973, pp. 142–143) points out, present both a “model of” and a “model for” reality. Working on the political customs of indigenous groups in Bali, he describes a metaphysical theatre which expresses “a view of the ultimate nature of reality and, at the same time, to shape existing conditions of life to be consonant with that reality; that is, theatre to present an ontology and, by presenting it, to make it happen” (Geertz, 2013, p. 104). But while drama often presents a “finished version of the world” (Boal, 2009, p. 63) that makes spectators “delegate powers passively to the characters to act and think in their place”¹³ (Boal, 2009, p. 64), specific techniques can turn passive spectators into “spect-actors” that actively take part in the drama and can change it (Boal, 2009, pp. 153–154). Understood in this way, drama can be a learning experience and a rehearsal to effect change in the real world (see Yamin, 2012).

Following those ideas, Mockus' interventions are a special kind of drama. They are deliberately created public scenes that use actors (such as mime-artists or Mockus himself) to engage citizens in a drama that conveys a moral (about what should and should not be done) and conveys normative information (typical and desirable behaviour). They do so by disturbing everyday life through strange and unexpected motifs (and as Wilson & Gilbert show [2015], self-relevant and unexplained events create attention and emotional responses, which then fade when the event is repeated). In this sense, they are also very close to the “dramatic acts” through which social movements reframe “audiences' understandings of social reality” (Benford, 2013, p. 139).

¹³ According to Boal (2009, pp. 153–154), tragedies, one of the major forms of drama, are based on a character's *harmatia*, a flaw in their behaviour, which is both the source of their current happiness and of their gradual decline and catastrophic end (Boal, 2009, pp. 153–154). By establishing empathy with the character, which represents people as “better than people nowadays are” (Aristotle, 2013, p. 19), tragedy creates a cathartic effect on the spectators by effecting, “through pity and fear, the purification of such emotions” (Aristotle, 2013, p. 23). In this way, Aristotle's tragedy makes spectators purify their own *harmatias*, and with them the behaviours and forces that go against the ruling value-system.

Dramatic acts such as sit-ins, protests or discourses (or indeed mime artists), are meant to change the way people interpret specific social problems to foster collective action around them.

And although the interventions make use of artistic and theatrical elements to create dramas and narratives, the drama is not completely disguised in everyday life: the spectators and recipients of narratives know that the performance was put together by the Mayor's Office (or any other institution) to create reflections around a specific topic (and this fact is always underlined during the interventions). In this way, a similar effect to the "alienation" or "estrangement" in Brecht's theatre is achieved (see Brecht & Bentley, 1961). By deliberately disrupting the "illusion of being unseen spectators at an event which is really taking place" (Brecht & Bentley, 1961, p. 13) and by taking "typical rather than unique" (Brecht & Bentley, 1961, p. 8) characters, the audience is prevented from taking the performance as pure entertainment. Rather, it is a reflection space around collective problems, which in a way similar to fairy tales, "subtly, and by implication only, conveys [...] the advantages of moral behaviour, not through abstract ethical concepts but through that which seems tangibly right and therefore meaningful" (Bettelheim, 1991, p. 5).

In this respect, Mockus' interventions use the classic and powerful framework of public representation that theatre and rituals use, but they pose deliberately as political acts that question the current ways of doing, and engage the public in a collective reflection about possible change. It is an internal deliberation that is proposed to the people, not the imposition of a norm or an attempt to persuade. In this self-entheatic exercise, society is induced into observing itself from a third-person perspective and offered alternative scenarios. While Mockus' interventions leverage very powerful social psychological mechanisms, they still leave freedom of choice; they colour the whole process with a playful touch of humour and humanity "mockusery" that does not ostracize the persons who do not behave, but gently mocks their behaviour as a fellow insider of the community. Drama and the gentle touch (peer pressure rather than punishment) are likely key reasons why these interventions raise so little resistance and reactance, as change is decided collectively rather than forced. These aspects of Mockus' intervention, their social-psychological engine, have not been studied in depth yet.

Studying how people interpret these "dramatic acts" (Benford, 2013) and how they narrate them is essential to understand their success or failure, as well as their reach beyond the people that experienced them directly. For Kenneth Burke (1945, p. xv; Branaman, 2013, p. 15), we make sense of human dramas, from theatre plays to political conflict, through five terms (known as the dramatic pentad): Act ("what was done"), Scene ("when or where it was done"), Agent ("who did it"), Agency ("how he did it"), and Purpose ("why"). Cultural conventions determine a certain

balance, or “ratio”, between those elements; and an unbalance between two or more of the terms creates Trouble, which is the source of Drama (Bruner, 1991).

Mockus’ dramatic acts draw their power precisely from this unbalance, this reinterpretation of cultural conventions. In modern societies, our everyday routines are full of debilitating boredom (see Highmore, 2002, p. 2) and fetishized images (see Debord, 1961). When turned into boring routines, time is emptied of all content and perception becomes “unconsciously automatic”¹⁴ (Shklovsky, 1965, p. 3). This “channelled state”, as described in Installation Theory (Lahlou, 2017, p. 153), is one of the crucial ways in which the layers of installations produce appropriate and expected behaviour. But because of this, it usually also makes difficult for users to reinterpret and redesign installations. Questioning routines, proposing reinterpretations of naturalized representations and transforming the everyday performances described by Goffman (1959, pp. 28–82) is difficult: “that’s the way we are”, “that’s the way we have always done things around here” or “everybody does it and they won’t change” were common sentences in my times as practitioner.

But despite this pessimistic image, everyday life is also full of creative possibilities, of mystery and passion. It is also full of alternative uses and reinterpretations (de Certeau, 1990, p. xlv). Moreover, creative transformations can emerge by deliberately creating *situations* (in the words of Debord, 1961) or *moments* (Lefebvre, 1991, p. 207) that break routines and naturalized meanings by exposing their arbitrariness. In the words of Installation Theory, this entails breaking the continuous process of “guided practice and conditioning response” (Lahlou, 2017, p. 188) through which installations reproduce embodied interpretive competences that “induce subjects into performing some specific behaviour appropriate to the installation” (Lahlou, 2017, p. 188). It is also very similar to what Lewin (1947a, 1947b, p. 211) describes as “unfreezing” the present level of the force field before introducing change, which in some cases involves breaking “the shell of complacency and self-righteousness” by deliberately creating “an emotional stir-up” (Lewin, 1947b, p. 211). Through its continuous reinterpretation of the world, art does just this:

“And art exists that one may recover the sensation of life; it exists to make one feel things, to make the stone stony. [...] The technique of art is to make objects ‘unfamiliar’, to make forms difficult, to increase the difficulty and length of perception because the process of perception is an aesthetic end in itself and must be prolonged” (Shklovsky, 1965, p. 4).

¹⁴ “...if one remembers the sensations of holding a pen or of speaking in a foreign language for the first time and compares that with his feeling at performing the action for the ten thousandth time, he will agree with us” (Shklovsky, 1965, p. 3).

Mockus' interventions attempt to leverage these mechanisms by exposing social consequences, alternative uses and creative reinterpretations in order to transform naturalized behaviours (Tognato, 2017; Yamin, 2012). As he argues himself: "It is about leading, but not directing: What people love most is when you write on the blackboard a risky first half of a sentence and then recognize their freedom to write the other half" (Mockus, 2015). Because of that, the efficacy of large-scale interventions is directly related to the interpretations and narratives that the people create from them¹⁵.

Narrative persuasion

As already discussed, the Civic Culture interventions make a deliberate effort to include in their procedures and to create narratives that are compelling (Wilson & Gilbert, 2015), that allow cooperative interpretations and reinterpretations (Benford, 2013, p. 139; Eco, 1993; Shklovsky, 1965, p. 3), and that breach conventional expectations and norms (Bruner, 1991). In this sense, they are different to many other behavioural change interventions based on social norms (see Study 1), which are often limited to transmitting argument-based messages with normative information (such as the famous "75% of the guests participated in our new resource savings program by using their towels more than once" in Goldstein et al., 2008, p. 476).

Despite this, some researchers in social psychology have started to explore behavioural change interventions based on social norms that use narratives as their delivery method, for example, in TV and radio soap operas and other forms of "edutainment" (Leroux-Rutledge, 2016; Paluck, 2009a; Paluck & Ball, 2010; Tankard & Paluck, 2016). These studies have shown how narratives are an effective way of transforming both social norm perceptions and behaviour in real-world contexts, especially when the contents are transmitted through social and public outlets rather than individual and private ones (Arias, 2015). Nevertheless, most of this research assumes that these narratives transmit "messages carrying information about social norms" (Paluck & Ball, 2010, p. 2) without exploring the underlying psychological mechanisms through which people make sense of stories and are influenced by them.

Research on narrative persuasion has attempted to do this, arguing that while social psychological research has long explored how argument-driven messages can influence people's beliefs, attitudes and behaviours, it is only recently that it has also started to explore more systematically how narratives can do so as well (Brinberg & Hamby, 2012). These mechanisms, of course, are not

¹⁵ Antanas Mockus, personal communication, 28/08/2017.

novel: they have been used and reinvented for centuries in other fields such as government, literature, journalism or marketing (Brinberg & Hamby, 2012; Green & Brock, 2002, p. 315), and they seem to dominate an important part of our daily attention and our lived experience (Hamby, Brinberg, & Jaccard, 2016).

But as Brinberg and Hamby argue, although studies in this area “have identified a number of relevant theoretical mechanisms [...] and have established their effect on behavioural and pre-behavioural outcomes, the causal mechanisms and relative importance of these relationships are not yet well understood” (Brinberg & Hamby, 2012, p. 191; see also Green & Brock, 2002, p. 315; Strange, 2002, p. 263). A significant step in this direction is the “Conceptual Framework of Narrative Persuasion” –CFNP of Hamby, Brinberg and Jaccard (2016), which attempts an integration of different mechanisms of narrative persuasion identified from previous empirical research, meta-analyses and theoretical work. The framework is based on a causal relationship between a *deictic shift* (a shift of one’s self-awareness and regular point of view to that of the story, see Galbraith, 1995, p. 21) and the narrative reflection – deictic return process (through which meaning is created) that create persuasion outcomes in beliefs, attitudes and behaviours.

Researchers have measured and tested several mechanisms associated to narrative persuasion and its effects on beliefs, attitudes and behaviours. Apart from the ones already mentioned, moderators such as retrospective reflections (Hamby, Brinberg, & Daniloski, 2016), ending valence (Hamby & Brinberg, 2016), emotional engagement (Busselle & Bilandzic, 2009), affective adaptation (Wilson & Gilbert, 2015), issue relevant thinking and explicit argumentative content (Hoeken & Flikkers, 2014) have shown positive correlations with persuasion outcomes.

The usefulness of narratives to transform behaviour in real world contexts has also been explored by several researchers outside the realm of social norms (especially on the field of health, where meta analyses have found positive correlations, see Hinyard & Kreuter, 2007; Miller-Day & Hecht, 2013; Shen, Sheer, Li, & Shen, 2015). Inspired by Lewin’s (1947a, 1947b, p. 197) interventions based on a collective discussion of new narratives that lead to a collective decision, Gregory Walton and colleagues (Kentthirarajah & Walton, 2015, p. 1; Walton, 2014; Walton & Dweck, 2009; Yeager & Walton, 2011) are exploring the considerable and sustained effectiveness of “redirecting the narratives that people have about themselves and the social world in a way that leads to lasting changes of behaviour” (Wilson, 2011, p. 11) in a wide variety of topics¹⁶. These “story editing”

¹⁶ Including social belonging and value-affirmation in college, theories of intelligence and stereotypes in middle school, satisfaction and third person perspective taking in marriage, enhanced self-esteem and reduction of medical errors (Kentthirarajah & Walton, 2015, p. 6; Walton, 2014; Walton & Dweck, 2009; Yeager & Walton, 2011).

(Wilson, 2011, p. 11), “movie interventions” (Kenthirarajah & Walton, 2015, p. 1) or “social-psychological interventions” (Brummelman & Walton, 2015; Walton, 2014; Yeager & Walton, 2011), distinguish themselves from nudge interventions that only target a particular decision and rather influence “core beliefs or other aspects of the self and thus people’s behaviour as it unfolds over time in diverse settings” (Kenthirarajah & Walton, 2015, p. 1).

The Narrative Policy Framework

The importance of narratives for human sense-making also extends to the processes of design, implementation, reception and evaluation of policy interventions (McBeth & Jones, 2010). As argued before, this importance is even higher in those policy interventions that aim to influence citizen behaviours, as the narratives that different policy actors create around them can be determinant in their potential to influence or persuade the target population. Because of this, studying the narratives that different actors create and share around policy interventions can be essential to improve both its understanding and its effects. The “Narrative Policy Framework” (NPF) provides a systematic and structural method to analyse some of the main components of the narratives around policy processes and outcomes (see McBeth & Jones, 2010; Shanahan, Jones, & McBeth, 2018; Shanahan, McBeth, & Hathaway, 2011). Recognizing that relevant policy aspects are socially constructed, and that their variation is often bounded by aspects such as beliefs systems and ideologies, the NPF provides the elements to analyse the structure and content of policy narratives through their (i) setting or context, (ii) plot, (iii) characters and (iv) moral. These four elements constitute the minimal structural qualities that have been used to define narratives in policy settings, and they allow for a certain degree of testing, generalizability and comparison between different policy contexts that is difficult in less structured approaches.

2.3. Conceptual framework summary and gaps in the literature

In this section I have presented the main concepts, theoretical frameworks and research findings that structure my understanding of the civic culture initiatives by Antanas Mockus (as examples of creative behavioural change interventions based on social norms). As announced, I first focused on the psychological literature around social norms and how they affect behaviour and behavioural change (section 2.1). To do this, and in order to understand how social norms are inserted on a much broader field of research, I first presented an overview of some of the main concepts that organize popular theories of behaviour and behavioural change (in section 2.1.1). There, social norms and social regulation appeared as one in a list of non-exclusive concepts that have been

explored to explain both behaviour and behavioural change. This was complemented with an overview of the main elements or steps that popular applied models of behavioural change use to intentionally promote behavioural changes, and which predictably can be organized into diagnostic, design, implementation and evaluation phases (and an additional, transversal one). Then, I also discussed how different authors have also identified specific techniques that have and can be used to change behaviour, both in general and specifically using social norms.

After that (in section 2.1.2), I presented the concept of social norms in psychological research, using among other frameworks the definition by Bicchieri (2006, p. 11), and I reviewed how the concept of social norms is used in four popular theoretical frameworks in psychology to explain behaviour. Finally, I presented a broad review of some of the main areas of psychological research into the relationship between social norms and behaviour, which were divided between the characteristics that these social norms and behaviours have and their relationship with the context.

Then, in the second part of the section (2.2), I presented the new approach to behavioural change interventions based on social norms that the civic culture initiatives by Antanas Mockus seem to configure (in 2.2.1). And I presented two research areas that might help to better understand these interventions and that configure the focus of this project: the installations and local determinants of behaviour as described in Installation Theory (section 2.2.2) and the relevance of narratives and drama in behavioural change and policy initiatives (section 2.2.3). Through those sections, I presented Mockus' interventions as dramatic acts (Benford, 2013) that use a wide range of creative intervention mechanisms to intentionally reconfigure the three layers of local installations (Lahlou, 2015, p. 2) in a way that creates appealing narratives (Debord, 1961; Hamby, Brinberg, & Jaccard, 2016; Shklovsky, 1965) that ultimately enact social-normative messages (Tankard & Paluck, 2016). In order to better understand Mockus' interventions from a psychological perspective, this project explores those characteristics.

Across those sections, I also underlined the main gaps in the literature that I hoped to explore. These can be summarized schematically in the following way:

- A. As discussed in section 2.2.1, the civic culture interventions by Antanas Mockus are an emblematic case of social norm interventions that have shown impressive results in producing long-term transformations in complex social problems and in large and complex contexts (such as whole cities). Although they have been researched from several disciplinary perspectives, they haven't been studied yet from a psychological perspective. This could significantly inform the increasingly popular literature and practice around social

norm and other types of behavioural interventions, and the general purpose of the project has been structured to provide insights into this.

- B. As discussed in section 2.1.1, although several authors have focused on the main practical techniques that can be used to promote behavioural change both in general and specifically in relation to social norms, a systematic overview and an analytic framework was still lacking and could have great benefits. Apart from providing an overview of current practice and inform a wider range of possibilities, this could support better descriptions and understandings of the techniques that are specific to the social norm realm. This, as well, could inform the issue of how Mockus' interventions compare to the more traditional social norm interventions that are applied in the literature.
- C. As discussed in section 2.2.3, some researchers have explored and tested the potential that narratives (often in the form of "edutainment") can be an effective way of transforming social norms and behaviours in real-world contexts. Nevertheless, most of this research assumes that narratives are just a vehicle to transmit "messages carrying information about social norms" (Paluck & Ball, 2010, p. 2), and deeper explorations about the underlying psychological and social mechanisms through which people make sense and are influenced by those narratives is rare. More specifically for Mockus' interventions, in which narratives seem to have an even greater importance, the narratives that relevant stakeholders hold about them had not been systematically collected or analysed before. In both areas, such an exploration could provide a deeper understanding of this phenomenon and from it, hopefully inform more effective interventions.
- D. And finally, the last of the main gaps that this project will explore, as discussed in section 2.2.2, has to do with Installation Theory's prediction that behavioural change interventions should modify the three layers of behavioural determinants and do so at the time and place of delivery in order to achieve strong and durable effects. Although limited evidence has been produced in this respect, the relationship between this idea and social norm interventions hasn't yet been explored (and, as we have seen, might hold one of the keys to understand the potential of Mockus' interventions). Specifically, social norm interventions are often described generically, without assessing or describing the local physical, psychological or social determinants that affect their target behaviour or how the intervention they applied affected them (both in terms of the three types and the context of delivery). A clearer understanding of these issues could once again inform both research and practice of the design and implementation of social norm interventions.

3. Research strategy and methodology

In this section, I present the general research problem that this project addresses (3.1). I then follow with an overview of the research strategy and methodology of each of the studies my co-authors and I conducted (3.2).

3.1. Research problem

As argued before, behavioural change interventions based on social norms in field settings are becoming increasingly popular among researchers and practitioners (Bicchieri et al., 2014; John et al., 2014; Kenny & Hastings, 2011, p. 61; Mackie et al., 2012; Paluck & Ball, 2010; Sunstein, 2016). Nevertheless, these interventions have had mixed effects in changing behavioural outcomes, including their immediate effectiveness and the endurance of the changes over time (see Cialdini, Reno, & Kallgren, 1990; John et al., 2014; Lapinski & Rimal, 2005; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007).

The interventions applied by Antanas Mockus (Mockus, 2002; Tognato, 2017; Yamin, 2013), which have not been studied in depth under a psychological focus (as described above in literature gap A), show that behavioural change interventions based on social norms can be much more effective and durable than has been recognized (John et al., 2014), even in scales as big as whole cities. As I argued in section 2 before, in contrast with most behavioural change interventions based on social norms applied in the literature which are limited to providing argument-based group summary information messages (see Study 1), these interventions seem to combine a wide range of creative strategies and mechanisms to intentionally reconfigure the three layers of local installations (Lahlou, 2015) and prompt narratives about dramatic acts (Benford, 2013, p. 139; Debord, 1961; Hamby, Brinberg, & Jaccard, 2016; Shklovsky, 1965, p. 3) that enact social-normative messages (Tankard & Paluck, 2016) that will be remembered and re-told. They also, by their public display character, leverage collective self-reflection mechanisms and make them akin to rituals and drama.

In an attempt to better understand these critical factors of Mockus' interventions from a psychological perspective, and to contribute to their corresponding gaps in the literature, three studies were designed. These are presented in sections 4, 5 and 6 of this document. Following the three factors of interest described in section 2.2.1. and the gaps in the literature summarized in section 2.3 above, studies focused on:

- The practical intervention strategies and mechanisms that are used in social norm interventions (including those by Mockus) to achieve behavioural change (Study 1 in Section 4, which addresses literature gap B above),
- The narratives that are used by policy actors to interpret and disseminate interventions (Study 2 in Section 5, which addresses literature gap C above),
- The use of the three layers of local determinants of behaviour in local installations (Study 3 in Section 6, which addresses literature gap D above).

By contributing to a better psychological understanding of Mockus' interventions and these three critical factors, my objective was to also contribute to the understanding of how social norm interventions can create behavioural change around real-world social challenges. But first and foremost, my ultimate academic-political-personal goal is that these understandings can contribute to the practical application of more effective and sustainable behavioural interventions based on social norms in real-world contexts. This focus on scientific understanding motivated by practical utility guided the decisions pertaining to the project's research problem and strategy, the methodology, the publications and the outreach activities. As we argued in the discussion of Paper 1, rather than studies that are "good to publish", I wanted studies that had the potential to inform practice in a meaningful way.

The following table (6) presents the three main factors defined above, their corresponding research questions, and the three studies that were designed to answer them:

Table 6. Factors, research questions and studies of the project

Factor	Research questions	Study
Mockus' interventions seem to use a wider range of interventions strategies and mechanisms than the behavioural change interventions based on social norms that are typically applied in the literature	<ul style="list-style-type: none"> - <i>What intervention strategies and mechanisms are used in the behavioural change interventions based on social norms in the literature?</i> - <i>What are the main dimensions that can be used to characterize and organize these strategies and mechanisms?</i> 	Study 1. A systematic literature review to analyse the practical intervention strategies and mechanisms used in behavioural change interventions based on social norms in the real world
	<ul style="list-style-type: none"> - <i>How do the intervention strategies and mechanisms used in Mockus' interventions</i> 	

Factor	Research questions	Study
	<i>compare to the ones in the literature?</i> ¹⁷	
Mockus' interventions rely on the narratives that key policy actions create and share to achieve their effects	<ul style="list-style-type: none"> - <i>What are the main characteristics of the narratives that key policy actors share about Mockus' interventions?</i> - <i>What is the role of the narratives that key policy actors share about Mockus' interventions?</i> 	Study 2. A qualitative study to analyse the narratives that key policy actors share about Mockus' interventions
Mockus' interventions combine intentional reconfigurations of the physical, psychological and social determinants of behaviour in installations	<ul style="list-style-type: none"> - <i>Are social norm interventions that are in-situ and using exposure to behaviours and opinions, more effective than those using remote group summary information?</i> - <i>Can social norm interventions based on the installation theory framework be effective (even in contexts where training, incentive, control and feedback procedures are already being applied)?</i> 	Study 3. Field experiments to test the effects of a social norm intervention based on the Installation Theory framework

To explore those questions, the project obtained the relevant ethical and data management approval from the LSE (presented in Annexes 3 and 4 respectively).

3.2. Research strategy

This section provides an overview of the research strategy and methodology chosen for the three studies conducted in this project, which are then presented as publishable or published papers in sections 4, 5 and 6. Rather than a detailed account of each of the studies' methods, which are already presented in their full texts, this section aims to explain the rationale behind their selection,

¹⁷ Because of the focus that we gave Paper 1 for publication, which was inserted in the field of sustainability studies and described the general overview and framework of strategies and mechanisms used by social norm interventions (addressing the first two research questions), the research question that deals with Mockus' interventions was only partially addressed there (see section 3.2 in the paper). Because of that, the answer to this question, which has been included because it is essential to the general argument of this project, will be provided in the discussion sections of the framing materials (see sections 7.1 and 7.4).

the process I followed to apply them, some of the difficulties I encountered and the solutions I found.

3.2.1. Study 1: A systematic review of behavioural change interventions based on social norms

Background and objectives

In order to answer the first set of research questions in the table above (5), my co-authors and I conducted a systematic literature review of behavioural change interventions based on social norms. Through it, I wanted to explore the main strategies and mechanisms through which those interventions try to transform behaviour, and to propose an analytical framework that could inform their description and design. Apart from giving an overview of current practice that would be useful in itself to both researchers and practitioners, this would also shed some light on how Mockus' interventions compared in this aspect to others, and how they could be classified in comparison to them.

As already discussed, different researchers have described some of the main practical intervention techniques or mechanisms that can be used to intentionally transform behaviour. Some of the most popular examples include Michie et al.'s (2011) identification of Behavioural Change Techniques (also from a systematic review), and Sunstein's nudges (2016). But although relevant and useful, these techniques do not consider directly social regulation and social norms (but rather processes such as social support or comparison of behaviours). In the field of social norms, different authors have described some of the most popular techniques, which include the Personalized Normative Feedback approach, and focus groups discussions (Miller & Prentice, 2016), media campaigns (Bicchieri, 2017, pp. 142–162; Paluck, 2009a), and also legal means, economic incentives, and deliberation (Bicchieri, 2017, pp. 142–162). Nevertheless, a broader systematic picture of the wide range of techniques that are used in the literature and a relevant framework to organize them is a gap that, if addressed, could significantly contribute to both research and practical applications. Study one provides such a picture.

The practical techniques that behavioural change interventions based on social norms use to influence normative perceptions and behaviours are not a minor issue. As we showed in the resulting paper, these techniques can often be traced to some of the most fundamental debates in psychological theory and should not be obscured under general expressions like “we applied a social norm intervention”. For researchers, the specific strategies and mechanisms that interventions use can often drastically affect the way in which normative information is perceived,

interpreted and shared by participants. For practitioners, this is often one of the most critical steps when trying to find the difficult balance between effectiveness, sustainability, available resources and feasibility that planning and applying a successful intervention often requires.

For both groups (researchers and practitioners), having an overview of intervention strategies and mechanisms, as well as a deeper understanding of the main dimensions that describe them and of how they are applied in the literature, can contribute to more clarity when reporting and learning about them, therefore facilitating scientific capitalization and transfer. Also, it can contribute to a wider range of options that can be better adapted to different research questions and local conditions, and even to determining which mechanisms can be more effective and sustainable for specific goals and contexts, therefore improving the effectiveness of interventions and their scope.

Study design and methodology

To obtain a broader and more balanced sample of empirical studies than the ones that traditional reviews usually rely on, we applied some of the procedures that are used in systematic literature reviews. Such reviews provides “a systematic, explicit, [comprehensive] and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners” (Okoli & Schabram, 2010, p. 1).

Because our objectives were directed primarily towards understanding and describing a wide variety of mechanisms in a wide variety of contexts and targets of intervention, and because of the resources available to the project, we decided to produce a qualitative synthesis (Okoli & Schabram, 2010) of the sample rather than a quantitative meta-analysis. A statistical analysis of the effects of these interventions, although valuable and necessary, is for us a second step and should be done using a different (more focused and strategic) sample. In contrast to the typology of practice we produced, which benefits from a sample that is as wide and varied as possible (linked to categories and application examples that are also as varied as possible), such an endeavour would require a sample that is much more homogeneous in terms of contexts and problems of intervention, that is chosen with much stricter quality criteria, and that somehow selects “good” examples of our dimensions of interest. Although relevant and interesting, this is beyond the reach of my PhD project, which is certainly a limitation of our study as recognized in the published paper.

The detailed search, data collection and analysis procedures we used are described with enough detail in the “Materials and Methods” section of Study 1 (in section 4.1) and in the detailed research protocol of the review and codebook, which is presented in Annex 5. This research protocol was defined using Okoli and Schabram’s (2010, p. 7) steps to guide a systematic literature

review, and was based on thorough explorations of the literature and practical tests, as well as a benchmark of the procedures used by 7 popular systematic literature reviews for compatible research questions. Its conception was guided by the effort to maintain a balance between the resources available to the project (in terms of time, people, technical skills and access to published literature), and obtaining a sample that was as broad and varied as possible, all while applying standardized and generally accepted procedures.

In terms of the analysis, an important challenge was the extraction and interpretation of data from the selected articles in the sample. From the literature review and the main conceptual frameworks that guide this project, I knew that critical elements in the sample were the types of normative information used (from the basic descriptive/injunctive distinction in Cialdini et al. [1990] and the sources of normative information [Tankard & Paluck, 2016]), as well as the context of application relative to target behaviours (which relates to the three layers of local determinants of behaviour described in Installation Theory [Lahlou, 2015]). Nevertheless, I did not know how these elements would look in the actual reports that studies made of their intervention procedures, and how we could produce a framework that had an adequate level of detail but was general enough to guide action.

Building the framework and describing the 16 mechanisms that go with it was a complex task that involved extracting the text passages with intervention procedures from the selected articles, reviewing their full texts several times, and discussions with researchers and practitioners. For this, the work with the International Labour Organization described in the “outreach” section below (section 7.5) was crucial. Discussing with practitioners and experts from the global headquarters and several field offices in Latin America, Asia, Africa and the Middle East, allowed me to get a much better understanding of the types of “methodological artefacts” that could be useful to inform what was widely regarded as one of the major challenges when trying to apply social norms campaigns: the design of intervention strategies and mechanisms. As the results of this work show, the proposed solution consists of a general framework that shapes two of the more crucial strategies of social norm interventions (the context of application relative to behaviour and the type of normative information provided), and a more detailed list of 16 mechanisms that spanned over the three layers of Installations to guide the more specific actions of the intervention. On the other hand, the popular descriptive/injunctive distinction (Cialdini et al., 1990) was not taken into account after realizing that a considerable number of studies did not include the necessary details to tease out which of the two types was used. In passing, this raises interesting questions about how experimental procedures and results are being presented, if in practice it is not possible to tease out which side of this basic theoretical distinction is being applied.

Following these ideas, the coding framework we used (see Annex 6 for our complete list of coded studies) included basic characteristics of the studies (such as target behaviour or sample size), the categories related to the context of application, and the type of normative information provided (as described below, including Remote, In-situ, Group Summary Information and Exposure to Behaviours and Opinions interventions), and the description of the intervention procedures of each experiment which was used to build the list of 16 mechanisms.

Finally, for the “qualitative synthesis” (Okoli & Schabram, 2010) that constituted the results and discussion of the study, we presented the general characteristics of the sample and the studies, we described each dimension of interest and we discussed the theoretical frameworks and ideas behind them, and we presented the list of 16 mechanisms. In order to explore patterns of relationships between these basic characteristics and the dimensions and mechanisms included in the sample, we conducted a Multiple Correspondence Analysis -MCA (Abdi & Valentin, 2007). The output and coordinate plots from this analysis are presented in Annex 7. And finally, we discussed implications for theory and practice, and we formulated policy recommendations based on the advantages that the different strategies described in our sample showed.

As was our purpose, this allowed us to describe a wide variety of intervention strategies (dimensions) and mechanisms that have and can be used in behavioural change interventions based on social norms (which is the main objective of the paper we published, see section 4). But by doing this, we were also able to better understand some of the strategies and mechanisms used in Mockus’ interventions, and how they compare to other social norm intervention in the literature (see section 7.1).

3.2.2. Study 2: A qualitative study to analyse the narratives that key policy actors share about Mockus’ interventions

Background and objectives

The second study we conducted in this project was meant to explore the main characteristics and the role of the narratives that key policy actors hold about Mockus’ interventions. As argued in the conceptual framework, the narrative accounts that stakeholders create and share around policy initiatives are essential to understand almost every step of the policy-making process (McBeth & Jones, 2010; Shanahan, Jones, & McBeth, 2018; Shanahan, McBeth, & Hathaway, 2011). This is especially true with policy initiatives that require some form of citizen participation or that seek to influence citizen behaviour, since the narratives that people create and share about an intervention can determine how much they are influenced by it.

As reviewed above, psychological research has explored the essential role of narratives in shaping how we understand the world and communicate with others (Bruner, 1986; László et al., 2002). Also, it has explored how narratives can transform our beliefs and behaviours (Hamby, Brinberg, & Jaccard, 2016), and their importance in the design, formation and implementation of public policies (McBeth & Jones, 2010). And indeed, a defining feature of Mockus' interventions seems to be the narratives that citizens and policy actors created around them (see Martin-Barbero, 2017, pp. 279–285; Mockus, 2017, p. 611), and that transformed them from curious artistic initiatives (for example some mime-artists in a few street intersections), to stories that most of the inhabitants of the 7-million-people city still remember today.

But nevertheless, despite the importance that narratives seem to have for Mockus' interventions, they have never been empirically researched. Understanding their main characteristics and the role that they might have in how people make sense and narrate them is essential to better understand their particularities and effects. And by doing so, it might also shed some light on the importance of narrative accounts to how people make sense of social norm and other behavioural policy interventions. In this way, it might also inform the design of more effective and sustainable interventions.

Study design and methodology

In order to study these topics, I decided to collect the narratives that key policy actors hold around one of Mockus' interventions. This allowed to concentrate efforts on understanding the structure and content of the narratives that each type of actor has, and the differences and similarities between types of actors, without having to ponder the different events and interpretations that might be linked to different interventions (which would be focused on different behaviours and target populations as well). By doing this, I chose to privilege at this stage a more detailed account of the narratives around a specific case and the comparison between different types of actors, in expense of the generalizability of these accounts to different interventions (which is certainly a limitation of the study and should be a next step in future research about this topic).

With this in mind, I decided to focus on what is arguably the best-known of Mockus' initiatives: the mime-artist intervention. This was one of the first “civic culture” interventions applied from the city's administration (in Mockus' first few months as Mayor of Bogota in 1995). Apart from the potential of having a greater quantity and variety of narratives than less popular interventions, I chose this intervention because it has reached a somewhat paradigmatic status when talking about

Mockus' approach and in this sense, it could provide unique insights as a first step in the research of narratives about it.

Regarding the policy actors that we would examine, I focused on the three more prominent that are featured in previous research and press accounts (e.g. Sommer, 2006; Tognato, 2017; Yamin, 2013): the targets/participants of the intervention (the citizens of Bogotá), the communication channels that disseminated the information about the intervention (the media outlets), and the original creators of the intervention (the people in charge of its design or implementation). Each of these types of actors had specific difficulties in terms of access and data collection.

Narrative data can be collected and analysed through a wide variety of qualitative and quantitative methods, from surveys and interviews to participant observation and textual analysis (see Harbison, 2011; Jovchelovitch & Bauer, 2000; László et al., 2002; Shanahan et al., 2011; Shkedi, 2004; J. Smith, 2015; Squire et al., 2008). Our first target population was the citizens of Bogotá, which were the targets/participants of the mime-artist intervention. Taking into account the diversity that the current residents in a 7-million people capital display in terms of socio-economic status, gender, age, and whether they lived through the intervention 25 years ago or heard about it afterwards, I chose to collect narratives from a large sample of data (instead of a few detailed interviews, for example). Unfortunately, the resources available to the project prevented us to apply a representative sample of the city's population, so I opted to apply open-ended surveys to almost 200 citizens through my and my co-author's networks of university students, local social organizations and NGO's (the questionnaire we used is presented in Annex 8). The resulting sample of 117 valid answers was balanced in terms of age, socio-economic status and gender.

As for media narratives around the intervention, we were faced with the difficulty of availability and access to media archives. Most of the media outlets we approached either lacked materials from so long ago, lacked any type of thematic search (e.g. keeping just physical tapes or articles per date), or charged very expensive fees for accessing each video or article. The only major media outlet that existed at the time of the intervention and also had a free online search engine for their archive is the newspaper *El Tiempo*, which also happens to be the major written press outlet both at the time of the intervention and today. Using their online search tools, we defined standard search terms and selected 80 press articles among 4,191 initial hits that included a description of the intervention (we excluded those that only mentioned it by name and those that were unrelated).

Unfortunately, designers of the original interventions were much more difficult to locate and access. After trying for several months to contact a sufficient number of them that were willing to give detailed interviews about the process, we were only able to conduct two interviews ourselves and obtain two more from a previous academic publication. For the most part, people were not interested in talking about a project that happened so long ago, and forwarded us to press articles and previous publications. Because of how few they were, but also how rich in details and information, we decided to focus the main analysis on the data from citizens and the press only, but to also keep the collected designer narratives to gain deeper insights and provide contrasts and complements. A sample of citizen, press and designer narratives are presented in Annex 9.

Then, for the analysis, we selected two methods that allowed us to assess both their content and their structure. When examining the content, as described in Study 2 in more detail, we extracted their main thematic classes and “lexical worlds” using the automated textual analysis techniques described in Schonhardt-Bailey, Yager & Lahlou (2012). A statistical software (usually Alceste or Iramuteq), builds thematic classes through statistical calculations of the associations between both words and sets of words. This method gave us a clear, replicable method to analyse the main thematic classes of the dozens of narratives we collected, and to compare them between policy actors. The basic statistics and characteristic words and phrases from this analysis are presented in Annex 10, while the outputs of the Multiple Correspondence Analyses performed by the software are presented in Annex 11.

And then, for the structure, we extracted the main elements using an adapted version of Shanahan et. al.’s (Shanahan et al., 2018) Narrative Policy Framework codebook (presented in Annex 12). The codebook allowed the collection of narrative data about three central elements of narratives: the plot that describes a temporal element and provides causal mechanisms, the characters that tackle, cause or suffer from policy problems and the moral which offers solutions or next steps to solve the problem (McBeth & Jones, 2010). After comparing agreement rates, two of the co-authors of the study and I manually coded random groups of the collected narratives (for the quantitative analysis) and extracted relevant passages in each category (for the qualitative analysis).

These two complementary data collection procedures allowed us to determine what are the main thematic areas, characters, plots and morals that the narratives of citizens and the press rely on, as well as the relative importance of each one in terms of size. Together, the findings shed light into how these policy actors make sense of the mime-artist intervention, what are the main

elements they use to structure their narratives, and what are the main themes that are used to narrate them. And by doing this, our hope once again is to inform both research (by providing a case study that should be contrasted with other cases) and practice (by providing recommendations of elements that are linked to a successful case) around policy interventions that seek to influence the behaviour of people.

3.2.3. Study 3: A field experiment to test the effects of a social norm intervention based on the Installation Theory framework

Background and objectives

Finally, the third study of this project was designed to explore another characteristic of Mockus' interventions that might be linked to their success. Specifically, we wanted to explore how Mockus' interventions are not limited to providing normative information, but they are also applied using mechanisms that reconfigure local physical, psychological and social determinants of behaviour (as the Installation Theory framework recommends). But being interventions that are applied in real-world contexts by real-world public authorities and institutions, they did not emerge in a vacuum. As often happens in these situations, these interventions were applied to complement other policy interventions that were already being applied with limited success.

The mime-artist intervention in Study 2, for example, was designed to complement other standard policy initiatives that were already being applied: laws and regulations, formal enforcement by authorities, physical signs and markings, and so on. The value in the mime-artist intervention, of course, is that it successfully redesigned the configuration of a layer that wasn't channelling "appropriate" behaviours in that situation: the social one. A critical point for practical application, then, is whether implementing a behavioural change initiative in addition to these more traditional measures can produce enough benefits to justify their use. One can suspect that real-world interventions need to be far more powerful than artificial lab studies to reach a measurable effect. Another critical point, of course, is the temporal dynamics of the change and how durable it is.

Following these ideas, we decided to design a study in which we could test the effectiveness of using the Installation Theory framework to identify and design relevant social norm interventions in a context where other initiatives to influence behaviour were already being applied. This implied using the Installation Theory framework to better understand an activity in a real-world setting, collecting and analysing data about how the three layers of determinants were influencing the

target activity, and then designing a social norm intervention to redesign the social layer (but using mechanisms in the psychological and physical layers as well as Mockus' interventions often do).

According to our findings in Study 1, we knew that there are many different ways (strategies and mechanisms) to apply a social norm intervention. As our paper showed, despite this wide variety, the literature also shows a considerable bias in favour of interventions that are applied away from the context where behaviour happens (remote) and using argument-based group summary information messages (such as percentages and graphs describing typical and desirable behaviours). Mockus' interventions (and several other examples in the study's sample), on the contrary, seem to use a variety of intervention mechanisms that include exposure to behaviours and opinions and other ways to address locally the three layers of determinants of behaviour described in Installation Theory, a strategy this theory predicts will be more effective. Following this, we also wanted to compare the effects on behaviour of social norm interventions applied remotely and through group summary information only, on one hand, with an intervention that was closer to those applied by Mockus' (that is, in the framework of this study, using exposure to behaviour and opinions in both remote and in-situ dimensions, and using also psychological and physical elements), on the other.

Among several target contexts and behaviours that we considered for the study, we finally chose a medium-sized transportation company in Colombia. More specifically, we decided to focus on driving behaviours and their impact in fuel consumption (broadly called "eco-driving" in the literature). This is an area that has considerable financial and environmental impact for companies and other stakeholders in the transport and mobility sectors, and which has a substantial body of literature related to behavioural change interventions and a gap related to social norms (see Background section in Paper 3 and Bristow, Tight, Pridmore, & May, 2008; Gosnell, List, & Metcalfe, 2016; Walnum & Simonsen, 2015).

This context offered important methodological advantages, including an already secured access and interest from the CEO of the company, a manageable but sufficiently large population (around 250 full time drivers), and reliable and automated systems and procedures for measuring actual behaviours¹⁸ - while most studies only rely on declarations of behaviour, which are notoriously

¹⁸ As developed in the study's methodology, the company continuously collects data on average monthly fuel consumption per driver (using distance and fuel provided to each of them) and on other driver behaviours using a specialized telemetric device. In this case, all the trucks of the company have been fitted with a Navisaf device (<http://navisaf.com>), a local company that uses the GEOTAB GO7 (<https://www.geotab.com/vehicle-tracking-device/>). This is a telemetric GPS tracking device that monitors in real time, stores and produces alerts of several elements of the truck's instrument panel, including location, speed, acceleration, braking, and idle time, amongst other data. Using this data, the

unreliable. More importantly, after initial talks with the CEO of the company and other employees, it became clear that social regulation aspects around driving were not being considered by company procedures and could have a considerable impact when added to the strong psychological and physical elements they were already putting in place to influence driver's behaviours (which include training and re-training protocols, direct incentives or penalties to the best/worst drivers, and feedback and control mechanisms based on technological sensors and devices that measure performance). By testing our hypothesis in a more controlled environment and using more reliable behavioural measures than those we could achieve in more complex environments (such as peaceful coexistence in public places or bullying in schools which we had also explored as possible cases), we were hoping to provide a first approach that could then be replicated elsewhere.

Study design and methodology

As detailed in Paper 3, following the Installation Theory framework and other models of behavioural change (see sections 2.1.1 and 2.2.2) our study was conducted in four stages: diagnostic, intervention design, application, and evaluation. After choosing the target context and behaviour, the first step was to conduct a diagnosis to better understand driving behaviours in the company and the specific local determinants that were relevant for its drivers. To do this, one of the co-authors and I conducted a first fieldwork in the different headquarters of the company, which included in-depth interviews and presentations to key stakeholders inside the company, company data analysis, and the application of the Subjective Evidence-Based Ethnography –SEBE protocol (see section 2.2.2 – a note on research ethics for the SEBE technique is presented in Annex 13).

In total, we conducted 5 in-depth interviews with the CEO of the company, and managers and staff of the operations, security, purchases and maintenance areas. We also made several presentations to them about our project, its methods and its goals, and we collected baseline company data about demographic, fuel consumption and driving behaviour variables. Finally, we applied the SEBE protocol (Lahlou, Le Bellu, et al., 2015) with five drivers, which allowed us to collect more than 5

company produces monthly ratings with the driving behaviours and average fuel consumption for each driver.

hours of video materials between first-person perspective driving videos and their corresponding replay interviews. Sample data from driver replay-interviews is presented in Annex 14.

The results of this diagnostic allowed us to make an inventory of the current initiatives that the company was applying to influence driver behaviours, and to obtain a complete overview of the main physical, psychological and social determinants that were relevant for driving behaviour in that context (see Table 1 in section 2.2 of Paper 3 for a summary). Specifically, we noticed that the company already had strong measures in the physical and psychological layers to influence driving behaviours, including 6 training, incentive, control, and feedback procedures.

Nevertheless, we also noticed that the social layer was not much present apart from the formal internal regulations applied by the company (which was seen as a control body that only wanted to save money) and the national traffic legislation. Specifically, drivers didn't know how their own consumption compared to that of others (descriptive norms) and they had a general perception of fuel waste and theft as justifiable (injunctive norms). Unfortunately, operational difficulties with the company prevented us to apply a larger survey to measure the prevalence of these norms. After lengthy considerations, we decided we did not want an intervention that was just "good to publish", but rather an intervention that was consequent with the real-world complexity of the target context, that was effective and produced real-world benefits, and that could inform both research and practice. In this sense, rather than test a clear-cut psychological phenomenon (which would require much more simplistic and limited intervention methods), we wanted to test whether the application of a specific framework could have beneficial effects even with the initiative already being implemented by the company. The idea was that, by demonstrating the impact of our intervention (hoping it would yield positive results) we would first progress on the scientific field and publish a real-world experiment that could become a landmark in term of how to operationalize the theories; but furthermore we could show with detailed results on saved fuel costs and perhaps other improvements that such interventions are feasible and profitable to the industry. Our publication choice (see section 6) of using a widely read journal specialized in the field of transport in one of our publications is a direct application of this strategy of real-world impact on top of academic contribution.

As detailed in Paper 3, apart from the control condition (which rather than no-intervention was the group which continued receiving the usual initiatives of the company), and a remote / group summary intervention condition (a card with Personalized Normative Feedback – see sections 2.1.2 and 6.1), we created a "Mockus-like" intervention using inputs and feedback from co-authors,

drivers, and the company. This alternative intervention was based on the exposure to behaviour and opinions in Study 1, and consisted on a 10-minute workshop in which drivers saw a 4-minute video of other drivers and received a keychain and decoration material for their truck, all of which was framed in the “reduce the flip-flop” concept (see paper). These procedures were based on both remote inception (the workshop) and in-situ cue elements (the keychain and decoration for the truck), and included mechanisms in the social (exposure to behaviours and opinions of other drivers in the video), psychological (context and factual information about the target behaviour as well as concept of the flip-flop), and physical layer (physical objects distributed). The production of the video was done using the ideas and words of two voluntary drivers, which were filmed in their own trucks driving and speaking of the need to “reduce the flip-flop”. Rather than using purely factual information, as most studies do, we added dramatic elements in the intervention with music, comedy, images, a striking concept anchored in the drivers’ folklore (the flip-flop), all of which were intended to transform the information into a narrative that could both connect the information to the driver culture and transform it into a story worthy of acting as a token for conversation. A copy of all the intervention materials used is presented in Annex 15.

To test the effectiveness of these interventions, we used a pre-test/post-test/control group design by randomly assigning drivers to the three conditions, and we defined hypotheses, variables, and outcome measures (see Paper 3). As part of this, we estimated that paired T-tests on the pre and post average fuel consumptions of each group would give us an 80% power at $\alpha=0.05$ with at least 35 drivers per group.

But despite our plans, as often happens in real-world field experiments, we faced several difficulties. This includes the unexpected change in the system that measured behavioural driving events (personal data about sudden accelerations, sudden braking and speed excesses) which prevented us to obtain comparable baseline and post intervention data that could be included in the analysis of this first experiment (and because of that, we used only average fuel consumption as outcome measure). Also, the significant rotation rates of company drivers meant we had to exclude from the experiment a significant number of the drivers that were initially assigned to each group, since our analysis methods required us to include only those that had data available for all the 4 months we recorded it (baseline plus three post-test months). Because of these conditions, which respond to the historic operation of the company rather than our experimental design, we recorded a rather high attrition rate of around 35% for both control and treatment conditions. Finally, operational difficulties on the part of the company (in terms both of motivation and of being able to locate and deliver materials to drivers that are continuously moving around the

country), meant that we couldn't apply a survey among drivers to do manipulation checks or to analyse pre and post normative perception data. It also meant that the distribution of cards for the group summary information condition took a lot of time and was done during two months (which forced us to take the "application" period of that condition as both of those months). But while we were not able to apply the survey, the intervention cards were finally distributed to the right drivers and we were able to record their data.

After checking for normality, we used paired T-tests and the difference-in-difference technique to test the differences between average monthly fuel consumptions of the three groups. Apart from behavioural effects, we also calculated cost-effectiveness and return on investment of the interventions to quantify the financial benefits (if any) that each of the interventions produced for the company (showing whether it was worth applying them in addition to the measures already taken by the company).

Then, following the results of the first experiment (see Paper 3), which showed similar effects to the two treatment conditions, we decided to conduct a second study to evaluate whether an intervention that combined group summary information and exposure to behaviour and opinions and in which participants were exposed to intervention messages on more occasions could increase the magnitude and duration of the effects. As described in Paper 2, this second experiment included just one treatment condition and the control, and was based on the same video. Nevertheless, it also included some face-to-face discussion between the drivers (to improve exposure to behaviours and opinions), a technological feedback device I built instead of the keychain and decoration (to improve physical determinants of the campaign), and periodic SMS messages to the drivers for a few weeks after attending the workshop (to increase exposition to the messages). The same diagnostic, and the same experimental and analysis procedures from the first experiment were also used in this one, with the exception that in this case we were able to collect behavioural data and explore its correlation with fuel consumption data.

Together, the two experiments applied in Study 3 showed that Installation Theory can provide a systematic understanding of the local determinants of behaviour that might affect the application of social norm interventions, and that social norm interventions applied in this way can be a cost-effective alternative even when more traditional initiatives to influence behaviour are already being applied (such as incentives, training, and so on). Finally, the results also show a marginally better results in the long term (at 3 months after application) of the intervention based on exposure to behaviour and opinions compared with the one that only applied indirect group

summary information, but also compared with the one that combined both alternatives. Summary tables for experimental data about fuel consumption and driving behaviours are presented in Annexes 16 and 17 respectively.

4. Study 1: A systematic review of behavioural change interventions based on social norms

In this section I present the published version of Paper 1 of the project, which as described in Section 3.2.1, is a systematic review of behavioural change interventions based on social norms in real-world contexts. With it, our aim has been to address the research questions around the intervention strategies and mechanisms applied by these types of interventions, the main dimensions that could be used to characterize and organize them, and how did Mockus' interventions compare to them.

We framed our review, which was designed to include as many contexts and target behaviours as possible, under the broad frame of sustainability. Since the challenges that the environmental, cultural, economic, and social dimensions of sustainability of humans requires cannot be tackled without important changes in behaviour, which the Installation Theory and the social norm approaches have been shown to achieve in real world contexts, such framework provided our analysis and findings a meaningful field of research and practical intervention.

Three co-authors took part in this study:

- Professor Saadi Lahlou, my supervisor, helped with conceptualization and the design of the study, with the formal analysis, and provided feedback, insights and edits during the whole process.
- Sara Levy and Maria Fei, graduates from the MSc in Psychology of Economic Life at LSE, provided help with data collection, organization and interpretation, wrote short sections of the methods sections, and provided edits to the final draft.


This paper was published in October 2019 in the open-access *Sustainability* journal (IF=2.6). Eleven months after its publication, it has been accessed by more than 7600 people, cited 8 times, and it is in the 90th percentile among all the articles of the same age of any output in the Altimetrics Attention Score.

Finally, as developed in Section 7.5, the methods, sample and findings of this study were used in several outreach projects and activities, including consulting work with the headquarters and regional teams of the International Labour Organization, research activities with the Media and Social Norms Collaborator from the LSE, and a report and talk for the National Cultural Change Strategy for Public Servants from the agency of the Colombian government in charge of public governance (*Departamento Administrativo de la Funcion Publica*).

4.1. Paper 1: “Using Social Norms to Change Behavior and Increase Sustainability in the Real World: a Systematic Review of the Literature”

Review

Using Social Norms to Change Behavior and Increase Sustainability in the Real World: a Systematic Review of the Literature

Paulius Yamin ^{1,2,3,*} , Maria Fei ⁴, Saadi Lahlou ^{1,5} and Sara Levy ⁶

¹ Department of Psychological and Behavioural Science, London School of Economics and Political Science, London WC2A 2AE, UK; s.lahlou@lse.ac.uk

² Faculty of Transport Engineering, Vilnius Gediminas Technical University, 10223 Vilnius, Lithuania

³ Behavioural Lab LT, 14184 Vilnius, Lithuania

⁴ Behavioural Science Lead, Ipsos Healthcare, London E1W 1WY, UK; maria.fei87@gmail.com

⁵ Paris Institute for Advanced Study, 75004 Paris, France

⁶ EMEA Brand and Consumer Insights, Google, London SW1W 9QT, UK; levysara@gmail.com

* Correspondence: p.yamin-slotkus@lse.ac.uk; Tel.: +370-695-554-07

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Abstract: Behavioral change interventions based on social norms have proven to be a popular and cost-effective way in which both researchers and practitioners attempt to transform behavior in order to increase environmental and social sustainability in real-world contexts. In this paper, we present a systematic review of over 90 empirical studies that have applied behavioral change interventions based on social norms in field settings. Building on previous research about the sources of information that people use to understand social norms and other local determinants of behavior, we propose a framework organized along two axes that describe intervention context (situated interventions applied in the same context where the target behavior happens versus remote interventions that are applied away from that context) and type of normative information leveraged (interventions that provide summary information about a group versus interventions that expose participants to the opinions and behaviors of others). We also illustrate successful applications for each dimension, as well as the social, psychological and physical determinants of behavior that were leveraged to support change. Finally, based on our results, we discuss some of the elements and practical mechanisms that can be used by both researchers and practitioners to design more integral, effective and sustainable social norm intervention in the real world.

Keywords: social norms; social influence; sustainability; installation theory; normative perceptions; behavioral change; intervention; systematic review; field studies

1. Introduction

Administrators, policymakers and practitioners are increasingly aware of how transforming individual and collective trends of behavior is essential to achieve their goals [1–3]. Tackling the challenges in environmental and social sustainability that our planet currently faces cannot be done without important and long-term transformations on the everyday behaviors of individuals: “Desirable goals, such as lowering greenhouse gas emissions, reducing waste, and increasing energy and water efficiency can be met only if high levels of public participation are achieved” ([4], p. 544).

Such behavioral changes do not occur spontaneously as policies are established; therefore “behavioral change” must be designed. Because of this, even the best meaning and most sophisticated management systems, policies, laws or programs require some behavioral change in their targets to

succeed, and can often fail if these changes do not happen [5–7]. There are many theories of behavior and of behavioral change [1,8]; here we shall focus on one of the most popular, the use of social norms.

Influencing social norms, or the rules that describe what a certain reference group considers to be typical or desirable behavior in certain contexts and situations [9], is a popular way in which researchers and practitioners attempt to transform behavior in real-world contexts [3,8,10–13]. These initiatives have often focused on behavioral changes that increase the environmental and social sustainability of their target contexts. Successful examples include both challenges directly related to environmental issues such as energy and water consumption [14,15], sustainable transport use [16,17], recycling [18,19] and food choices [20–22], as well as broader social sustainability issues such as alcohol consumption [23], hygiene [24,25], and harassment and violence [6,26].

In these and other realms, since “humans are especially motivated to understand and to follow the norms of groups that we belong to and care about” ([3], p. 184), changing the perceptions we have about social norms is a powerful and cost-effective way of creating or reinforcing collective changes in behavior. Furthermore, since social norms are based on mutual regulation between social actors [6,7], it can also reduce the need for the costly authoritative enforcement or attitudinal change that many change initiatives attempt by using the “vigilante effect” through which members of a society tend, in situation, to enforce “correct” behavior in others ([27], pp. 140–144). The power of social norms in behavioral change does not come only from the natural inclination to imitate others or from the necessity to know what is appropriate to do in a given situation, but it is also rooted in the human desire to belong to one’s community. As Kurt Lewin aptly noted in his seminal paper on behavioral change, humans fear to stand out from the group: “the unwillingness of the individual to depart too far from group standards” ([28], p. 273) is a strong lever to influence behavior.

Social norms have been a central topic in psychological research for a long time [29–32]. Researchers in this and other fields have found relevant behavioral effects of interventions based on social norms in a very wide variety of domains, from pro-environmental behaviors [14,16,18,33] to violence and harassment [34–36], and from health related and risk behaviors [24,37–39] to gambling [40,41], to mention just a few examples. By testing some of the mechanisms and contexts in which social norms can have relevant effects, these field studies are an important resource for both practitioners and researchers to design more effective interventions to address all kinds of policy and social challenges.

Recent popular and influential texts that explore the topic of social norms [2,23,34] have described some of the practical mechanisms that have been used to achieve behavioral change in social norm interventions. These include, for example, the Social Norm marketing approach, the Personalized Normative Feedback approach, focus groups discussions [23], media campaigns [2,34], and also legal means, economic incentives, and deliberation [2]. Nevertheless, a systematic exploration of how these and other intervention mechanisms have been applied in the empirical literature was still lacking and could greatly inform the design and research of social norm interventions to increase sustainability in real-world contexts.

In this paper, we present such a review from a wide sample of over 90 empirical studies that have applied behavioral change interventions based on social norms in field settings. Our objective is not to evaluate or compare the reported efficacy of these interventions (which is for us a second, more difficult step and would require different methods and a different sample), but rather to explore how researchers have leveraged these sources of information to influence normative perceptions and behaviors. By doing this, our goal is to present an overview of current practice in a systematic analytic framework that is useful for researchers and practitioners. In this way, we hope to both contribute to a better understanding of how these interventions are applied in the literature, and also to inform the systematic testing and application of more effective and sustainable interventions both inside and outside academic settings.

1.1. Social Norms and Behavioral Change

Social norms determine the behaviors that, among all those that are possible in a given situation, “others (as a group, as a community, as a society . . .) think are the correct ones, for one reason or another” ([27], p. 124). By defining the socially accepted ways of acting in certain contexts and situations, social norms are a central part of social regulation, the process through which “other stakeholders regulate our activity” ([27], p. 124). By doing this, they also mark our membership and place in a group, how we perceive social situations, how we relate and interact with others, and how we respond to cultural products [29].

Empirical studies in psychology and other disciplines have explored extensively the potential of using interventions based on social norms to transform behavior in real-world settings [3,11,13,23]. These empirical studies have identified a wide variety of general topics of enquiry and moderators that influence the potential of social norms to change behavior. We list a few of the most popular areas of research below, differentiating between those that focus on the importance of the attributes of behaviors and social norms, and those that emphasize the importance of the contexts in which those behaviors and social norms are embedded.

1.1.1. The Importance of the Attributes of Social Norms and Behaviors

One of the best-known distinctions in the social norm literature is the one between norms that describe typical behaviors (called descriptive norms in Cialdini et al.’s Focus Theory [42] and in Bicchieri [2]), and those that describe desirable behaviors (called subjective norms in the Theory of Reasoned Action of Fishbein and Ajzen [43], social norms in Bicchieri [2] and injunctive norms in Cialdini et al. [3], see also [44,45] for further details). While the former (“descriptive norm”) refers to what I perceive to be typical behavior in a situation [3] (what most people do in Cialdini et al. [42]), the latter (“injunctive norm”) refers to what I perceive to be desirable behavior (what most people ought to do in Cialdini et al. [42]).

Several studies have explored the relationship between these two types of norms. There is evidence of descriptive norms having heterogeneous effects depending on the reference behavior levels (which can be desirable or undesirable in the intervention), with “boomerang effects” documented in some cases [18,46–48]. This has been successfully counteracted by adding injunctive elements to the messages, especially those reinforcing the desirable behaviors [49]. For example, messages about the high prevalence of petrified wood stealing [50] or about how your household consumes less energy than your neighbors’ [51] might lead to increases in undesirable behaviors if injunctive messages (i.e., about social desirability or un-desirability) are not added as well. In another study about voting behaviors, Gerber et al. [52] also found evidence that descriptive messages about the high prevalence of a target behavior (i.e., thousands people vote so you should too) can be more effective to change behavior than those about low prevalence (i.e. a low proportion of people vote so you should do it) or even injunctive norms (i.e., it’s the right thing to do or it’s a civic duty), especially among people that don’t engage often in the behavior. Injunctive norms, on the other hand, seem to be more effective when combined with accuracy or efficiency goals [53], and when formulated in a positive manner (i.e., “people think you should do this”) in contexts where descriptive norms are weak [54].

Dolcini et al. [55] have also emphasized the importance of taking into account and measuring some basic attributes of social norms such as norm homogeneity, strength and stability, as well as how these characteristics relate to different clusters in the population [55]. Lapinski & Rimal [45] underline how normative influences are determined by basic attributes of behaviors, such as behavioral ambiguity and privacy [24].

1.1.2. The Importance of the Context

The range of activities that people can undertake is not just determined by what is perceived as “socially acceptable”. The physical affordances of the environment and the embodied interpretive

systems of subjects also play an important role in locally funneling behavior [27]. In this way, when we decide to keep our place in line at the customs control point, we do not do it only because we read a message that says that most people do it as well. We also imitate others and are directly cued and corrected by specialized personnel and other fellow travelers on the spot, we have internalized norms and skills that indicate how to act in that situation, and there are often physical signs, marks and barriers that funnel the expected behavior.

Installation Theory states that behaviors are, in actual situations, the result of a compound of factors, of three types or “layers”: local affordances of the material context, embodied competences of the subject, and social control. These components coalesce in situ to provide a scaffolding and constraining behavioral “installation” that funnels behavior [27]. Because of that, effective behavioral interventions should not only address the individual’s “internal” factors that could predict behavior (such as representations, competences or perceptions), but also the local installations in which these behaviors are enacted. As a matter of fact, in the generic framework of Installation Theory, which encompasses the widest number of factors, the social norm appears as a limited approach to intervention. Nevertheless, the social norm, as it represents the standard behavior performed in the typical circumstance by the group members (“the way we do around here”), is a handy proxy for adequate behavior that can be reminded to the subjects in interventions and policy implementation. That is why social norms have been instruments of choice for such interventions.

Researchers working on social norm interventions have tested the idea that social norms are context-dependent, situational and require a focus of our attention to affect behavior. Several studies [42,46,49,56] have presented evidence of how the influence of social norms on behavior is not uniform in terms of context or time, but rather depend on them. Other researchers have underlined the importance of the perceptions we have of social norms and the sources we use to gather normative information [3,23,45,57]. As Tankard and Paluck [3] argue, psychologists are concerned, less about the actual rates of behavior of a population (which are more the interest of policymakers), and more about the “community members’ subjective perceptions of the norm” ([3], p. 181). These perceptions “become a reality and a guide for their own behavior, even when the perceptions are inaccurate” [3] (p. 183). The authors also distinguish three main sources that individuals use to gather normative information: the behaviors we see in others, the summary information we receive about a group, and the signals that different institutions send [3]. Also, Prentice and Miller [57] have shown how, in practice, a social norm can still prevail and influence behavior even when it is believed to be unpopular and dysfunctional (a phenomenon known as pluralistic ignorance).

When we pay attention to a certain social norm, we often do so in relation to a specific reference group that we think engages in and/or approves a certain behavior (for example our friends, our parents, our co-workers, or our neighbors). Consequently, many researchers that have also focused on how we use different reference groups to interpret social norms [35,58–60], the networks that organize them [35,61] and our sense of identity in relation to them [62,63]. These researchers have presented evidence on how involving local promoters [59,60], high-profile messengers [64], friends [65], role-models [66], in-groups [67] but also outgroups [57], and geographically and demographically close individuals [68], are all related to higher effectivity of social norm interventions.

1.2. Our Review

Our review emerged from the need to perform a systematic exploration into the intervention strategies and mechanisms used in behavioral change interventions based on social norms. Unfortunately, many researchers limit themselves to exploring the conceptual and research dimensions of behavioral change interventions without paying much attention to how these ideas and findings can inform and improve the practical design and implementation processes of such interventions. As Davis et al. ([69], p. 2218) argue, “while the social norms approach is based in a rich theory, the theory does little to illuminate implementation details of interventions”.

Nevertheless, as already mentioned, there are authors that have explored a limited number of practical mechanisms that have been used in social norm interventions [2,23,34]. Also, in one of the better-known examples outside the realm of social norms, Michie et al. [70,71] have identified 93 behavioral change techniques to report the intervention procedures of any kind of behavioral change intervention. Although relevant and useful, these techniques don't directly consider social regulation and its related mechanisms, but rather, in a more general way, processes such as social support or comparison of behaviors.

Based on a broad systematic sample, our review aims to produce a first overview of some of the main intervention strategies and mechanisms used specifically in field social norm interventions. With this objective in mind, and taking into account the previous literature on the subject, we focus on four areas of enquiry that are particularly relevant for the difficult task of developing intervention strategies once a diagnosis has been conducted [72]. These four areas pertain to:

- (1) Context of application (situated vs remote). The contexts in which intervention mechanisms are applied relative to the target behavior (specifically, following Lahlou [27], whether they are applied in the context where the target behavior happens or away from it)
- (2) Type of normative information (group summary information vs exposure to behaviors and opinions). The type of normative information that are intentionally leveraged in the intervention to influence behavior (specifically, following Tankard & Paluck [3], whether interventions rely on group summary information or exposure to the behaviors of others)
- (3) Intervention mechanisms. The different intervention mechanisms that are used to leverage the physical, psychological and social determinants of behavior (following Lahlou [27])
- (4) Combination of mechanisms. How the previous three elements are combined in the studies in the literature

In this paper, we first present the method of the systematic review and the basic characteristics of the sample we obtained. Then, we present and discuss the results we obtained in these four areas. Finally, we present some recommendations based on them to inform the design of more integral, effective and sustainable real-world interventions based on social norms.

2. Materials and Methods

In order to obtain a broader and more balanced sample of empirical studies than the ones that traditional reviews usually rely on, we applied the procedures that are commonly used in systematic literature reviews [73]. Because of our focus on exploring the particularities of intervention strategies and mechanisms in a sample that was as varied as possible, rather than on evaluating their results, we chose to produce a qualitative synthesis [73] of these mechanisms rather than a conventional meta-analysis [74].

2.1. Preparation and literature search

The first step after defining the type of empirical literature of interest to the study was defining a detailed protocol following Okoli and Schabram's [73] eight steps to conducting systematic literature reviews (including (1) Purpose, (2) Protocol and training, (3) Literature search, (4) Practical screen, (5) Quality appraisal, (6) Data extraction, (7) Synthesis of studies and (8) Writing the review). Data extraction formats were also designed for relevant activities, and researchers discussed extensively, pre-tested (sometimes several times), and trained on the general protocol and on the use of the specific formats.

The literature search was conducted on the 11th of May 2017 in six widely popular academic databases: Cochrane, Medline, PsycINFO, PubMed, Scopus and Web of Science. We used a Boolean formula to search for title only (in order to keep the number of hits manageable, otherwise initial hits would have been on the tenths of thousands). Keywords are presented in Box 1.

Box 1. Keywords used for systematic search.

"social norm*" OR "descriptive norm*" OR "injunctive norm*" OR "collective norm*" OR "normative*"
AND
"intervention" OR "field study" OR "field experiment" OR "randomized controlled trial" OR "randomized controlled trial" OR "program" OR "campaign" OR "initiative" OR "change"

2.2. Eligibility Criteria and Additional Searches

Initial hits from the database search (N = 1581) were screened for duplicates. The abstracts of the remaining articles (N = 523) were assessed under our practical screen—PS criteria [73]. At this stage, we included papers with an abstract in English (but text in any language), that presented empirical studies conducted in field settings, and that explicitly included social norms in their design as well as some type of behavioral outcome measure (in case of doubt, this was assessed from reading the full paper). Through this process, we excluded books, dissertations, research protocols or posters (because of the difficulty of obtaining digital versions and/or extracting the required information in many of them). We also excluded laboratory experiments and interventions that didn't measure behavioral outcomes (but measured only attitudes, behavioral intentions or norm perceptions, for example).

Then, the full text of the remaining articles was reviewed according to our quality appraisal—QA criteria [73]. Because of the focus of this review, these were relatively loose: we only excluded articles that did not have ex-ante and ex-post measurements of behavioral outcomes or a relevant control group (so as to assess general findings), or that did not describe in detail the methodological and intervention procedures used.

To complement our sample, we used the remaining articles to perform manual backwards searches (studies referenced by the selected articles) and forward searches (studies that cite the selected articles). We also contacted experts in the field and the authors of these remaining articles to ask for published and unpublished studies that matched our initial eligibility criteria. All the additional studies identified were reviewed through the same PS and QA procedures as the rest.

For both the PS and QA reviews, detailed definitions of the criteria were produced. Specifically, PS criteria included references that (i) were published as papers (books, dissertations, posters and research protocols were excluded), (ii) presented studies conducted in field settings (excluding laboratory or conceptual work), (iii) presented interventions that explicitly mentioned using social norms in their intervention design, and (iv) included at least an English abstract (but text in any languages). QA criteria excluded articles with studies that (i) lacked measurement of behavioral outcomes (even if self-reported) or (ii) lacked a clear description of methodological procedures and intervention mechanisms used.

Pre-tests were conducted (three in the PS and one in the QA) and inter-rater reliability measured (with Cohen's $\kappa = 0.856$ for final test of the PS and $\kappa = 0.841$ for the QA). The coding process for exclusion and inclusion of studies can therefore be considered reliable [75]. The process from identification to inclusion is summarized in the PRISMA diagram included in Figure 1 [76].

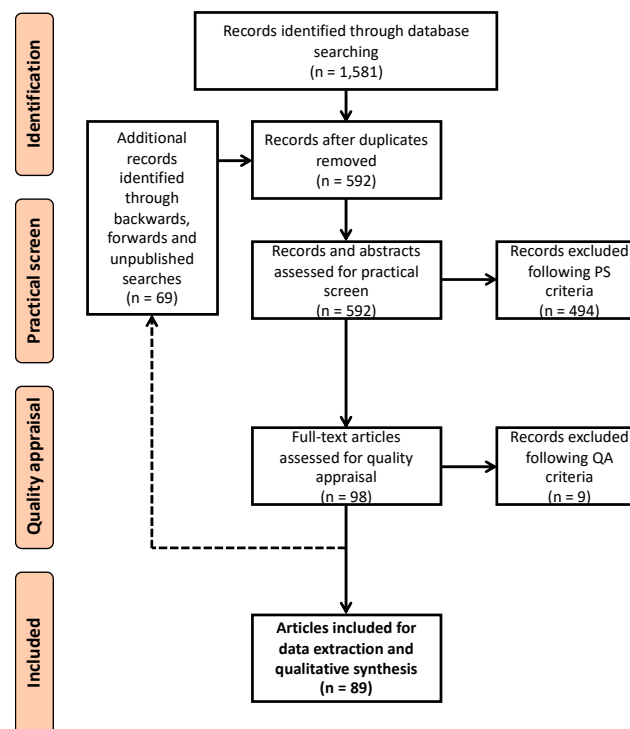


Figure 1. PRISMA diagram for systematic review.

2.3. Data Extraction and Analysis

Basic information about the study and the intervention in question was then extracted from the papers (such as the country, outcome measures, sample size and characteristics, treatment conditions or target behavior). Additionally, researchers coded the use of the two main dimensions described above (situated, remote, groups summary information and exposure to behavior and opinions), which was also previously pre-tested measuring interrater reliability (Cohen's $\kappa = 0.733$ – 1.000 for the two dimensions, thus also considered adequate [75]). Finally, we also extracted qualitative information about the intervention mechanisms that were used in each article and conducted a thematic analysis to find relevant categories that fitted the three types of local determinants of behavior (specifically, we copied and pasted the descriptions of intervention procedures that were used, such as workshops, emails or distribution of flyers, and then grouped these into the mechanisms presented below). For further reference, the complete list of studies selected can be found in Appendix A and the full coded set can be accessed in the Supplementary Materials (Table S1).

Additionally, in order to expand our analysis and explore in a more systematic way the interrelations between these elements, we applied a Multiple Correspondence Analysis–MCA [77] on the coded categories to explore the pattern of relationships between the main dimensions, the mechanisms, and the basic characteristics of each study. MCA creates two or three dimensional maps of components according to their variance [77], which allows to identify the categories that tend to appear together in a specific sample (in our case, the dimensions, mechanisms and characteristics that tend to be used together).

3. Results

After following the procedures above, our sample consisted of 89 published and unpublished articles that contained a total of 92 studies reporting the results of behavioral change interventions based on social norms in field settings. As already discussed, the studies are journal articles or unpublished manuscripts that explicitly use a social norm approach and that measure some type of behavioral outcome.

The studies in our sample were published between 1991 and 2017. Around two-thirds (66%) of them were published from 2010 onwards, and around half (47%) between 2013 and 2017. Five articles were yet to be published. Studies were conducted in 17 different countries, most in North America (68%), followed by Europe (19%), while only a few were conducted in other continents. Over two-thirds of the studies (66%) were conducted in the US, and only one study took place in multiple countries. All but three of the articles conducted a single study, which spanned 12 different topics. Over half of the studies (52%) targeted alcohol consumption. This reflects which issues are targeted by behavioral interventions and where, as published in the literature. These biases are interesting to note, and while our study is to some extent representative of the published research, it suffers from this limitation. Figure 2 below presents an overview of the distribution of some of these characteristics, while Table 1 below presents the frequencies of the categories that compose them.

Regarding study designs, the sample sizes varied greatly—from as low as 21 to almost 400,000. These were grouped into four categories which yielded fairly equal distributions: less than 200 subjects, 201 to 500 subjects, 501 to 1000 subjects, and over 1000 subjects. Around two-thirds of studies (63%) identified their participants as students, which is a classic limitation [78,79], but there was a wide variety of participants in the rest of the studies (see Table 1). Most studies (around four-fifths), used different treatment conditions and a control group as design, while the rest used pre/post designs without conditions or control groups.

Regarding data collection methods, the vast majority of studies used surveys and questionnaires. Only four studies used qualitative methods, while the rest used quantitative. Regarding outcome measures related to behavior, over two-thirds of the studies (70%) used self-report measurements only, while less than one-third (30%) used some kind of “objective” recording of behavior (either traces or direct). Additionally, around half of the studies used a wide variety of non-behavioral outcome measures, the most common of which are normative perceptions, risks and consequences of behavior, motivation, intentions or self-efficacy, and intervention exposure or relevance.

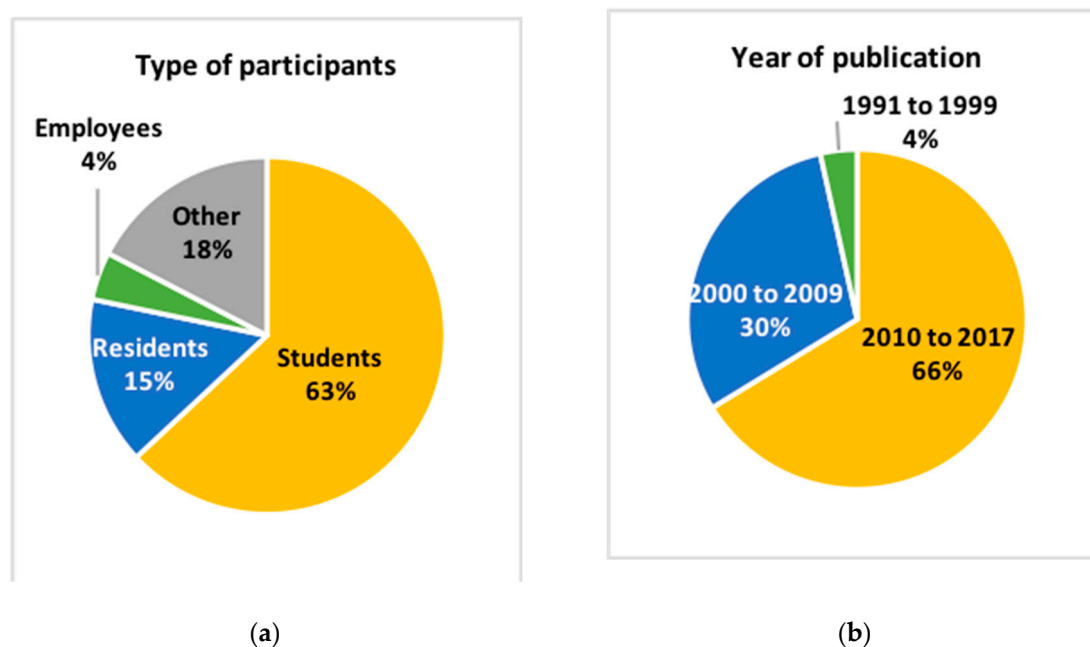


Figure 2. Cont.

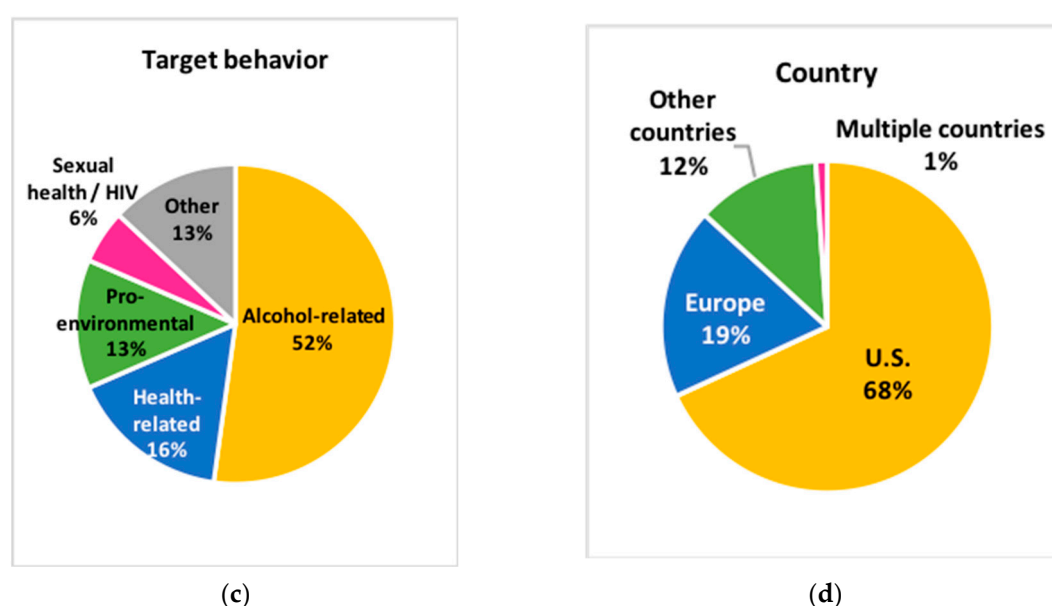


Figure 2. Distributions of type of participants (a); year of publication (b); target behavior (c) and country of participant in the study sample (d).

Table 1. Frequencies of countries, target behaviors and type of participants in study sample.

Countries		Target Behaviors		Type of Participants	
	Frequency		Frequency		Frequency
US	63	Alcohol consumption	48	Students	58
UK	7	Health behaviors	14	Residents	14
Netherlands	3	Pro-environmental *	13	Employees	4
Australia	2	Sexual health/HIV	5	Drinkers-drug users	4
Canada	2	Bullying/harassment behavior	4	Passers-by	3
Colombia	2	Gambling	2	Shoppers	2
Germany	2	Tax and retirement	2	Users of public restrooms	2
Switzerland	2	Counselling service use	1	Cyclists	1
Austria	1	Ethical behavior	1	Doctors	1
Denmark	1	Rating of interviews	1	Patients	1
Ecuador	1	Use of pedestrian crossings	1	Pension fund participants	1
Iran	1			Taxpayers	1
Kenya	1				
Multiple countries	1				
Poland	1	-		-	
Tanzania	1				
Zambia	1				

* Pro-environmental behaviors targeted included: water and energy consumption, use of sustainable transportation methods for commuting (bicycles), recycling and littering.

Finally, regarding effects, three quarters of the studies (75%) reported statistically significant effects (of $p \leq 0.05$) on the target behavior linked to social norms. Of those that included measures of actual behaviors (as opposed to self-reported measures), 89% reported statistically significant results with small effect sizes (in the few studies that report it) of partial $\eta^2 = 0.01$ – 0.04 (see for example Celio et al. [41], Brudermann et al. [80] or Wally et al. [40,80,81], which is consistent with previous reviews such as John et al. [11]). Most studies (71%) measured effects until six months or less after the intervention was measured, with around one third of the total (33%) doing it only one month or less.

Only around one-quarter of the studies (27%) measured these effects for more than 6 months after the intervention.

3.1. Situated and Remote Interventions

A first fundamental distinction in the way that researchers apply behavioral change interventions based on social norms is the one between those interventions that are situated, applied at the point of delivery of behavior (in situ), and those that are applied remotely, in a different context from the one in which the target behavior happens. As Suchman [82] noted, action is situated, and so is cognition [83], therefore it is likely that interventions situated where the action take place might have a different impact from remote ones. To use a typical example in our sample, it's not the same to distribute fliers with normative information in the context and moment in which the target behavior is happening (for example through coasters and table mats in bars to tackle drinking behaviors—see Moore et al. [84]), compared to distributing the same information remotely, one week before in an unrelated context (for example through an email or a postcard mailed at home—see Schultz et al. [15]).

Social norm interventions that are applied by researchers on the context where the target behavior happens (situated) rely on the idea that immediate contexts have some influence over behavior. Consequently, modifying in some way the context (which includes the physical environment but also the information that is available to people and the interactions that happen on it) should lead to behavioral changes. As already mentioned, researchers in psychology have long explored how the effect of social norms on behavior is not uniform over different contexts or times. In their famous “Focus Theory of Normative Conduct”, Cialdini, Reno and Kallgren [42] argue that “norms should motivate behavior primarily when they are activated (i.e. made salient or otherwise focused on)” [42]. Similarly, Aarts and Dijksterhuis [44] explore the concept of situational norms, showing that certain environments can automatically activate normative behavior, especially when (i) goals to visit the environment are active and (ii) strong associations between environment and normative behavior are established. Interventions that change local contexts have been shown to have important effects on transforming behavior. Among many examples, Lahlou and colleagues [85] showed how in-situ interventions to increase the water intake of children at home can achieve increases of more than 700% in the target behavior by leveraging the social (via a social support forum), physical (by providing water bottles) and psychological (providing training) determinants of behavior.

In our sample, less than half of the studies (39–42%) applied interventions on the context where the target behavior happens. Of these, around half (21–54%) were applied only in situ, while the other half (18–46%) were combined with remote interventions (away from the context where the behavior happens). Most interventions in this group were conducted in the U.S. (24–61%), targeted alcohol-related (10–26%), pro-environmental (11–28%), or health-related behaviors (8–20%) behaviors, and were applied on students (15–38%) and residents (10–26%). Most interventions that were applied in-situ did so by introducing specific bits of normative information messages in marketing materials such as fliers, cards, letters, posters and signs. Some interventions also used a wider range of materials, including t-shirts, water bottles, coasters, and stickers, and others also included media and digital platforms such as TV, radio, magazine, and theatre ads, as well as email messages, websites, and even interactive software.

These interventions explicitly or implicitly followed the strategies of the Social Norms Marketing—SNM approach [86,87], which is “a means of correcting norm misperceptions that involves publicizing (marketing) the actual rate of the misperceived behavior via the media, posters, emails, etc.” [23] (p. 341). For example, Schultz and colleagues [15,18] used door hangers and letters delivered at home to try to increase recycling and reduce water consumption in households, Lapinski and colleagues [24] used posters in toilets to increase handwashing behaviors, and Payne and colleagues [22] used signs in shopping carts to try to increase vegetable and fruit expenditure. In our sample, this information was often complemented with non-normative pieces of relevant information, such as the risks or

benefits of target behaviors, its related rules, regulations, and existing initiatives, and tips and goals to direct action.

Apart from providing information about actual rates of behavior (and the opinions around it), interventions have also attempted to communicate that a behavior is or isn't typical or desirable using marketing materials that are allusive to social vigilance or to broader campaigns. For example, Bateson and colleagues [33] and Brudermann and colleagues [80] used posters with images of eyes to influence littering and payment behaviors, and Paluck and Shepherd [35] used wristbands to express support for a broader social norms campaign against harassment.

Rather than relying only in these normative effects, some researchers also complement normative information with other mechanisms that support behaviors and interactions in the context where behaviors happen. In our sample, one way they do this is by supplying objects that support a target behavior (if the goal is to increase its occurrence). For example, Flüchter and colleagues [17] provided bikes to try to increase cycling to work, and Lahlou and colleagues [85] provided water bottles to increase water intake by children. In other cases, researchers also created interaction and social control processes with their interventions, including digital forums to discuss normative information and provide mutual support [85], mime-artists that made fun of traffic offenders and praised norm-compliers [6], or thumbs-up and thumbs-down cards for people to express approval or rejection of observed behaviors on the street [6].

Of course, some of these mechanisms to support behaviors, interactions, or control aren't linked to social regulation processes per se. Nevertheless, as happens in the studies of our sample, they can transmit powerful normative messages as well, or make the norm salient, and as such they can have powerful effects on social norm perceptions and more broadly in social regulation processes. Specifically, they actively support social control, they make visible the preferences and opinions of group members, and they communicate that someone is willing and able to act in favor or against a change initiative.

Other researchers that attempt to leverage social norms to change behavior in the real world do not apply their interventions in the context where the behavior happens, but rather in different and often un-related contexts. These interventions are based on the idea that, if people's behavior is influenced by their "subjective perceptions of the norm" ([3], p. 181) which "become a reality and a guide for their own behavior, even when the perceptions are inaccurate" ([3], p. 183), then changing those perceptions could change behavior in an enduring manner. In practice, this means that providing people with certain pieces of relevant normative information can ultimately persuade them of acting differently in the future (whenever they encounter the context where that norm and that behavior is relevant). Researchers have extensively used successful remote interventions to change behaviors, for example by providing normative information via a web-based survey that is related to decreases in overall alcohol intake [37,88]. While the connection to relevant behaviors and situations might sometimes be more difficult to achieve through these interventions, their advantage is that participants are usually much more focused on the intervention mechanisms than when performing the target behavior at the same time. Another advantage of this approach is practical: it is easier to give a message to subjects where one can easily gather them, than to install the message in all the sites where the behavior may occur. That is especially the case if, for example, those making the intervention are academics and their target is students.

As a matter of fact, most interventions in our sample (66–72%) applied remote interventions, with the majority of them (53–80%) not including any direct action on the target context. This means that while around half of situated interventions included some remote action as well, only a fifth of remote interventions include some situated initiative. As for their basic characteristics, most remote interventions were also conducted in the U.S. (48–73%), targeted alcohol-related behaviors (48–73%) and were applied on students (52–79%). Although they show similar characteristics to situated interventions in this respect, most remote studies were concentrated in these three categories (compared to situated interventions, which were distributed more evenly).

Here also, the most common way in which remote interventions were applied is by providing participants with normative information messages. Along with widely used fliers, letters, ads, and other marketing materials including very similar messages, a large number of studies used email communications and web-based surveys to apply a Personalized Normative Feedback—PNF [40,89] approach. PNF is a popular intervention method that attempts to correct “norm misperceptions” by “collecting participants’ self-reported incidence of some behavior and their perception of the incidence of this behavior among their peers and then providing them with the actual incidence of the behavior” [23]. In our sample, it was mostly used in interventions focused on alcohol consumption among students, where participants received an email, completed a survey, and then received feedback about their norm perceptions and about their consumption levels (which were then compared to the ones of a reference group).

And just as with situated interventions, remote initiatives attempted to communicate normative information in ways that are different from the usual group’s rates of behavior and opinion. For example, some authors used face-to-face interaction of experimenters with participants to discuss normative information [19,90,91], while others used videos with real-life stories [92]. Also, in a similar way to situated interventions, studies very often complemented this with the same type of non-normative relevant information (e.g. why this behavior is “better” than the alternatives).

In addition to remote interventions transmitting information to participants, some studies also generated discussions between participants about normative information they had previously provided. This was also complemented with discussions about other relevant information and personal experiences. For example, discussion topics led to participants’ “methods to keep themselves safe in party environments” ([93], p. 6), “accurate information about the prevention of HIV transmission” ([94], p. 443), or “explanations for men’s perceptions of false accusations of assault” ([36], p. 724).

And finally, some remote interventions in our sample were also complemented with mechanisms designed to support or facilitate target behaviors through the embodied competences [27] and motivations of participants. In this respect, the most popular one included training and skills building sessions that were relevant to the target behavior. This was sometimes done with participants, but also with key actors or referents that might influence the rest of the group. For example, Mogro-Wilson et al. [92] taught drug refusal skills to participants, Lahlou et al. [85] conducted online coaching sessions on water intake benefits, and Paluck and Shepherd [35] trained social referents (defined as “highly connected and chronically salient individuals in a community” [35], p. 899) to write and perform drama skits about common types of harassment in a school assembly.

There are also examples of interventions that generated commitments to action in participants or imposed relevant financial incentives and penalties. For example, this included students signing a contract with strategies to reduce smoking [95], monthly letters to hospital employees giving small incentives for buying healthy food at the cafeteria [21] and imposing fines to households that consumed significantly more water than average relative to their occupants [6]. Finally, one intervention aimed at reducing alcohol and drug consumption among adolescents also embedded normative information in psychological therapy sessions for participants [96].

In summary, the first dimension opposes what seems to be a majority approach of attempting to transform internal perceptions away of the contexts where the target behavior happens (remote), to a less popular approach of modifying the environments in which those behaviors actually happen (situated). Despite their differences, the vast majority of both types of interventions attempted to transform behavior by either distributing pieces of normative information messages, or by creating interaction processes between participants. We now turn to exploring this second relevant dimension in the way in which interventions are applied.

3.2. Interventions Based on Group Summary Information and on Exposure to Behaviors and Opinions

The second fundamental distinction we found in the way that researchers apply these interventions has to do with the way in which they attempt to communicate normative information (the typical or desirable norms of behavior that are meant to produce the change). On the one hand, most

interventions chose to give participants a persuasive message about the behavior or the opinions of the group (group summary information) [3], in some statistical format such as the “Four out of five college students wash their hands EVERY time they use the bathroom” in Lapinski, Maloney, Braz, and Shulman ([24], p. 27). On the other, many interventions also attempt to transmit this same information by creating the conditions for participants to be exposed to other people’s behaviors or expressed opinions. This includes, for example, generating collective discussions between participants in the spirit of Lewin’s [97] seminal work [36,98], representing drama skits with personal experiences or simulated situations [35], having social referents or well-known figures publicly endorsing or rejecting target behaviors [35], and even creating public demonstrations [6]. In a way, this dimension is about “cold” (anonymous information only) vs “hot” (involving exposure to behaviors and opinions) communication of the norm.

A similar distinction is defined by Tankard and Paluck [3] as the difference between normative information that is communicated through “summary information about a group” [3], and that which is acquired by perceiving group member’s “behavior or expressed opinions” ([3], p. 185). Researchers have explored extensively how receiving summary information about the behaviors and opinions of a group can shape the behavior of individuals. Reading simple messages about “how many people”, “how often” and “how positively my group feels” [3] (p. 189) about specific behaviors has been shown to have important effects on individual normative perceptions and behaviors, as many landmark social norm experiments have shown [18,46,49,50]. These “argument-based messages” ([99], p. 113) are cognitively-oriented modes of influence [99,100] close to paradigmatic modes of thinking [101].

Although they are popular in the general psychological literature about persuasion, argument-based messages are also “at odds with lived experience” ([99], p. 113). In the case of social influence and normative processes, most of the information that shapes our normative perceptions in everyday life comes from our interactions with others and from paying attention to their behaviors and opinions. Researchers in this respect have focused on how there are certain individuals that are especially influential over our perceptions of norms [35]. These social referents, as they call them, are “highly connected and chronically salient actors in a group” ([35], p. 899) that are weighted more heavily in their behavior and opinions when people “form their impressions of the norms of their reference group” ([3], p. 185). These referents can be real group members, but they can also be imaginary or role-models as well. Researchers have applied effective interventions based on these ideas, some even successfully changing the behaviors of a whole group by targeting social referents only [35]. This is supported by Kareev’s [102] research on how limitations of working memory mean that people usually rely on small samples of 7 ± 2 elements to make inferences about whole populations. In our case, for example, this means that when a person sees a group member around her recycling or expressing favorable opinions about it, she will infer that “recycling is typical and desirable for her group” ([3], p. 184).

As happens with remote interventions, group summary information interventions also seem to have a practical advantage: it is easier to design interventions that deliver information only, rather than setting up interaction contexts where the subjects are directly exposed to influence or persuasion by other group members. But while many studies assume that the two types of interventions are equivalent, they are based on different conceptions of social influence and persuasion processes. Moreover, they can often convey very different normative information, as statistics that describe average or majority trends in a population can differ greatly from the effects of confronting actual individuals that will likely hold different positions, as Michaeli and Spiro’s [103] research points out (As Reviewer 2 rightly argued, for example, “if half the population ranks the acceptability of abortions on a 1 to 5 scale as ‘1’ while the other half ranks it as ‘5’, the group-summary statistic that reports an average acceptability of 3 could have a totally different effect on behavior compared to exposure to individuals from both sides of the debate, which could lead, in some cases, to the emergence of biased norms”).

Interventions that are applied using group summary information rely on the idea that people’s perceptions of the norm can be transformed by providing them with information related to the rates in which group members engage, approve or disapprove a specific behavior. Maybe because of how

simple it can be to produce and transmit these messages, and because it is “in some ways the most straightforward manipulation of a perceived norm” ([3], p. 189), this type of approach is by far the most widely used in our sample when applying social-norm interventions (82 studies—89%).

As the studies in our sample show, interventions based on group summary information tend to be somewhat effective in transforming a very wide range of behavior in real-world contexts. Nevertheless, around one-fifth (17–19%) of the studies in our sample (most of which used group summary information) did not find effects on behavior linked to social norms. In the broader psychological literature, there is evidence supporting the idea that interventions based only on giving normative information can be ineffective to change behavior [104–107], and there is even evidence that message content or quantity of information can be unrelated to the effectiveness of social norm interventions [24]. On the other hand, combining normative information with other change tools (such as awareness of the problem, tools for action and prevention and a written promise—see Elias-Lambert and Black [108]), as well as making people conscious about the frequency in which they engage in a behavior and providing feedback about it [109,110] have both proven to be effective. Indeed, the vast majority of interventions in our sample mixed normative information with other mechanisms such as discussions, factual or context information, or calls for action and proposed goals.

In our sample, most studies (82–89%) relied in one way or another on delivering “argument-based” [99] messages with group summary information. This amounts to persuasion (using the logical, argumentative route) rather than influence. Most of those interventions (61–66%) used only this type of information without deliberately exposing participants to the behaviors or opinions of others. Because of this distribution, the profiles of the interventions that use summary information are very similar to those of our whole sample.

The two most common ways in which these interventions were applied in our sample was either by disseminating group summary information to the target participants as a whole (a strategy close to the Social Norms Marketing approach) or by adding to this information some feedback about how the participant’s individual behavior or perceptions compare to them (a strategy close to Personalized Normative Feedback). As was reviewed above, this included both situated and remote interventions. For example, studies that use the former strategy typically use marketing materials (ads, fliers, posters ...) to distribute messages like “Most Northwestern Montana’s Young Adults (88%) Don’t Drink and Drive” ([111], p. 869). On the other hand, studies in the later group use more personalized communication channels (especially emails linked to web-based surveys) to provide graphs and messages like “the number of occasions you drank was 4 times a week ... You told us that you believed that the average student drank five times a week ... The actual drinking norm for students at the University of Washington is 1.5 times a week ... you drink more than 91% of other college students” ([89], p. 436).

Researchers seemed to choose opportunistically the materials that worked better for their specific context and hypothesis: for example, signs were placed in shopping carts to increase produce demand [22], or coasters and glasses were marked with campaign information to reduce drinking [84]. Also, while some researchers relied on a single message and material, for example by only displaying normative feedback after completing a web-based survey through PNF [109], others combined several promotional materials that went from fliers and posters, to coasters, stickers, glasses, and meal planners [84].

Also, when applying these interventions, researchers often manipulate the way in which these messages are presented in order to test different effects on participants’ perceptions. For example, some researchers have explored the differences between using descriptive or injunctive norms [98], or how private or visible the target behavior is [24]. And just as with situated and remote interventions, researchers combined these normative messages with other actions that support or enable the target behaviors, such as providing non-normative information, tips for action, or different objects, for example.

In addition to providing generic summary information, some interventions include different resources to allow participants to collect information about behaviors and opinions of others so they

can experience social norms through personal interactions [112]. This is the first source of normative information described in Tankard and Paluck's [3] research, and is based on the idea that "individuals' subjective perceptions of norms are not derived directly from a comprehensive survey or a census" [3], but rather from "their unique and local experience" [3]. Instead of just providing a message with rates of behaviors or opinions, these interventions are based on creating interactions between participants which make visible the way group members are acting, their opinions on a topic, or their willingness and efforts to change (which arguably is how most normative information is transmitted and enforced in everyday life—see Paluck [112] and also the "vigilante effect" in Lahlou [27] p. 126). Interventions based on making visible certain group behaviors and opinions have obtained important results in city-wide scales, for example managing in a 7-million-people city to reduce indicators like homicides by 70% [113], deaths in traffic accidents by 65% [114], and per capita water consumption by 46% [115] in less than a decade (some of them included under Mockus [6]).

Around one-third (29–31%) of the interventions in our sample were based on direct exposure to the behaviors and opinions of others. Most of those (21–72%) did this in addition to generic summary information, were conducted in the U.S. (20–69%), targeted alcohol-related behaviors (14–48%), and were applied on students (17–59%).

In our sample, the type of actions used by interventions in this group included collective discussions between participants, face-to-face interactions and workshops between researchers and participants, and online support forums, but also theatre skits, videos, law enforcement, selling of bracelets by social referents, cartoons, and even public demonstrations. For example, Balvig and Holmberg [95] used discussions between pupils of a school about their own normative "misperceptions regarding cigarette smoking among their peers" [95], McCoy and colleagues [39] used a publicly displayed poster in a clinic for patients to paste a sticker when they attended three consecutive antiretroviral therapy visits, and Agha and Van Rossem [94], Mogro-Wilson et al. [92], and Paluck and Shepherd [35] used videos or theatre skits portraying relevant personal experiences and real-world situations.

These varied actions made visible three main types of information: group member's opinions, group member's behavior, and group member's willingness and efforts to achieve a certain change. For example, interventions based on collective discussions and forums between participants make visible their approval or disapproval of certain behaviors (desirable behavior), and in some cases also their reported behaviors on the matter (typical behavior). In a similar manner, theatre skits, videos, and other materials that make visible participants' behavior, their personal experiences, or simulated stories (such as cartoons—see Lapinski [24]), all exemplify behavior. Finally, actions such as law enforcement, social referents endorsement of the change interventions (through using and selling campaign bracelets, for example—see Paluck and Shepherd [35]), and public demonstrations, all show that people in the group are willing and actively trying to change the target behavior.

In summary, this second dimension describes two different ways in which normative information, which describes the typical and desirable behaviors in a group, is communicated to achieve behavioral change. On the one hand, the most popular approach is based on providing summary messages through a wide variety of marketing materials (group summary information), while, on the other, a less popular approach relies on creating direct interactions between participants that make visible their behaviors or opinions (exposure to behaviors and opinions).

3.3. *How are These Dimensions Combined in Interventions?*

Of course, the two dimensions described above are not applied independently, but are rather combined in very different ways in order to achieve their desired effects. Some studies used both remote and situated interventions, and others used both group summary information and exposure to behaviors and opinions. By representing these dimensions in a simple Cartesian system presented in Figure 3, we propose an analytic framework that can help understand and characterize how normative information is transmitted in behavioral change interventions based on social norms.

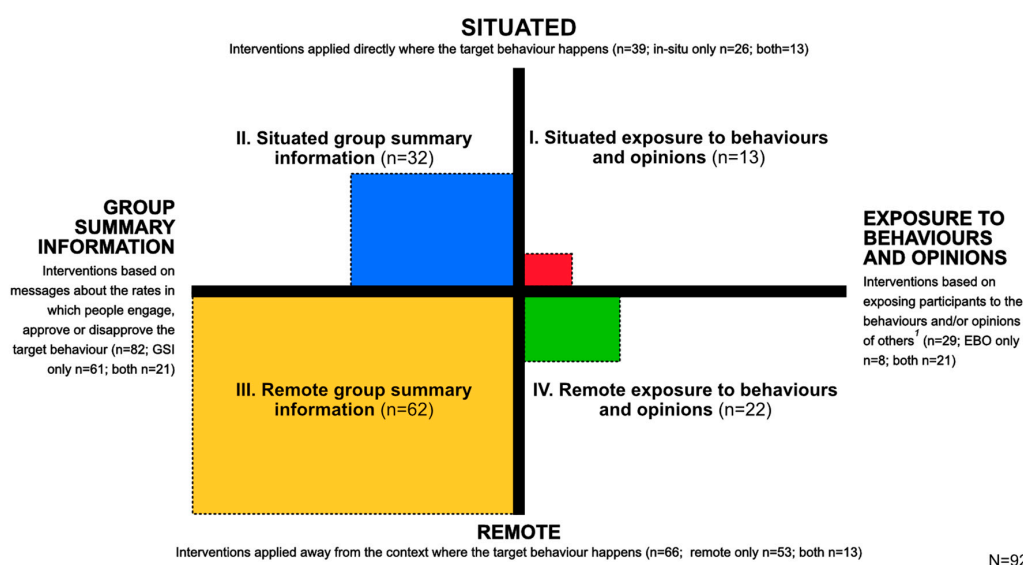


Figure 3. Intervention dimensions and popular applications.

As displayed in the diagram, where the squares are proportional to the number of sampled interventions in that quadrant, interventions that use group summary information are much more popular in the literature, especially those that do it away from the context in which the target behaviors are performed. This distribution is not surprising, considering the lower difficulty of creating normative messages compared to creating more complicated situations, and of broadcasting it where participants already are or can easily be assembled instead of the contexts where the behavior happens. This first result suggests that there is a practical bias in intervention design: easier interventions are more popular.

Exposure to behaviors and opinions, which arguably is how we collect most normative information in our everyday social interactions [3,112], has been much less explored in academic research. More than half of studies (54–57%) used remote interventions only, more than two-thirds (67–71%) used only group summary information. Very few interventions (11–12%) were applied in-situ and using exposure to behaviors and opinions, while even less (5–5%) opted to test all four quadrants of our framework.

In addition to that, the studies in these four quadrants used a wide range of intervention mechanisms that leveraged social, psychological and physical determinants of behavior to achieve their ends. In our sample, we found 16 mechanisms that studies used to achieve the desired effects, and that complement the ones described by authors like Miller and Prentice [23], Paluck [34] and Bicchieri [2]. These are presented in Table 2 according to which layer of installation theory they target.

Table 2. Intervention mechanisms.

Layer	Mechanisms (Application in Sample)	Common Applications in Sample
Social	Transmitting group summary information messages (situated–remote)	Messages summarizing normative information about a group, for example after completing survey or through email, or in promotional materials such as fliers, letters posters, signs, stickers and adds
	Exposure to behaviour and opinions (situated–remote)	Face-to-face interaction, videos, staring eyes in walls, drama skits, public rejections by social referents and public figures, as well as public demonstrations
	Generating discussions about normative information (situated)	Sessions with face-to-face discussions among participants
	Law and policy enforcement (situated)	Direct enforcement and control in specific contexts
	Mutual regulation (situated)	Creating situations or distributing objects that promote mutual regulation among participants, such as mime-artists, cards or whistles
	Social support (situated)	Creating digital forums to discuss normative information and provide mutual support

Table 2. Cont.

Layer	Mechanisms (Application in Sample)	Common Applications in Sample
Psychological	Providing factual/context information (situated–remote)	Information about risks/benefits of engaging in target behavior in signs, leaflets and posters, and context information in leaflets, fliers, or through digital media
	Providing tips and guides for action / goal setting (situated–remote)	Steps and goals for engaging in target behaviors in leaflets, fliers, or through digital media
	Generating discussions among participants (indirect)	Face-to-face sessions to discuss information relevant to target behaviors
	Generating training/skills building sessions (remote)	Face-to-face sessions to train and teach skills to participants and relevant referents
	Creating commitments to action (remote)	Contracts or symbolic actions to generate behavior-relevant commitments
	Providing incentives (remote)	Applying financial incentives or penalties for engaging in target behaviors
	Providing psychological therapy (remote)	Regular therapy sessions for participants
Physical	Modifying environments (situated)	Fixing promotional materials (such as posters or signs) or providing objects that support target behaviors (such as bikes, water bottles or whistles)
	Distributing papers/objects (situated–remote)	Distributing promotional materials (such as fliers or t-shirts) or objects that support target behaviors (such as bikes, water bottles or whistles)
	Generating interactions with digital platforms (remote)	Use of digital platforms (such as computers and smart phones) to distribute intervention materials and information

In order to explore further how these interventions were applied and their characteristics, we conducted a Multiple Correspondence Analysis—MCA to explore what experimental characteristics tend to be combined in our sample. MCA is a technique to analyze the pattern or relationships between different categorical variables which produces the principal components that account for the variance in the data [77]. The first two or three components often account for most of the variation in the data (or inertia), and this produces a map in which proximity denotes that certain modalities of variables tend to occur together.

To conduct our MCA, we included the two dimensions described above (situated/remote/Group Summary Information/Exposure to Behaviors and Opinions), together with the most popular (specifically, those with 10 or more occurrences in the sample) intervention mechanisms in Table 2 and the information on whether the study registered significant effects on behavior linked to social norms. We also included information on the target behaviors, types of participants and year of the study as supplementary (passive) variables. The results show two main components that account for 61.5% and 12.5% of the variance respectively, as the simplified diagram in Figure 4 presents.

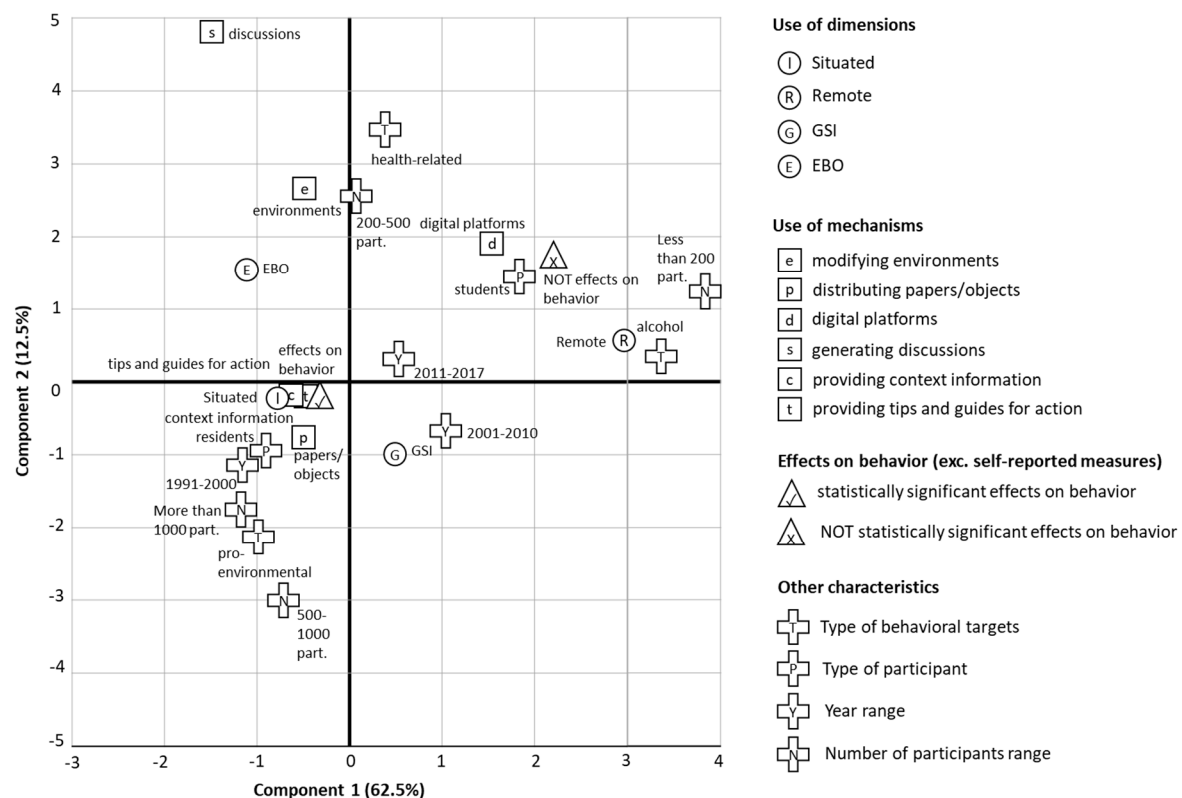


Figure 4. Multiple Correspondence Analysis. GSI refers to Groups Summary Information, and EBO to Exposure to Behaviors and Opinions.

Because of simplicity and space considerations, only the general associations that were drawn from the analyses will be reported here at the risk of losing some of their details and nuances. The complete MCA output and coordinate plot can be found in the Supplementary Materials (Figures S1 and S2 respectively). Two general conclusions emerged from this analysis:

- (1) The main axis, which accounts for most of the variance in the sample, opposes “lighter” interventions applied remotely, using GSI and digital platforms mainly on students (which as we have seen constitutes the bulk of our sample and is associated with quadrant III), with more complex interventions done in-situ, using exposure to behaviors and opinions, and relying on a wider variety of interventions mechanisms (associated with quadrant I). Characteristics associated with each of these groups are presented in Table 3.
- (2) When including only studies that recorded behavior (excluding self-reported measures) finding relevant effects on behavior appears more frequently among interventions in the group 2 (quadrant I). On the other hand, not finding effects is more frequent among interventions in the group 1 (quadrant III). Nevertheless, these results should be taken with caution, as they are based on a limited subsample of 28 studies (in which 25 found effects and three didn’t), and there is a great diversity of experimental contexts, targets and treatments in them.

Due to the low number of studies in this subsample that are linked to quadrants I and III, and because of the configuration of the main axis in the MCA, we hypothesize that these associations might be linked to the opposition between remote and situated interventions, as displayed in Table 4. This of course must be systematically tested based both on previous literature and new experimental data in order to assess its plausibility.

Table 3. Tendencies of dimensions, mechanisms and other study characteristics.

Characteristic	Group 1 (component 1 +)	Group 2 (component 1 -)
Dimensions	Remote Group summary intervention	Situated Exposure to behaviors and opinions
Intervention mechanisms	Digital platforms	Discussions among participants (about normative and non-normative information) Providing context information Providing tips and guides for action Modifying environments Distributing papers and objects
Target behaviors	Alcohol consumption Health behaviors	Pro-environmental behaviors
Participant types	Students Employees	Residents
Period of publication	2001–2010 2011–2017	1991–2000
Number of participants	Less than 200 Between 200 and 500	Between 500 and 1000 More than 1000

Table 4. Effects on remote and situated interventions (excluding self-report).

	Studies with Effects on Behavior Linked to Social Norms (Excluding Self-Reported Measures)	
	Yes	No
Remote only	3	2
Situated only	21	1
Both	1	0
TOTAL	25	3

4. Discussion and Recommendations for Policy Application

This review describes some of the main characteristics of a relatively large systematic sample of behavioral change interventions based on social norms applied in real-world settings. Its main focus is to describe the main strategies (dimensions) used to operate those interventions (situated, remote, group summary information and exposure to behaviors and opinions). We also describe the range practical physical, psychological and social intervention mechanisms used, and how they tend to be combined in the literature. Though we draw on some of the mechanisms and strategies that have been described by influential texts in the field [2,23,34], our review significantly expands their range, provide practical demonstrations, and a systematic framework to interpret them. These efforts are important, because they enlarge and shed some light on the range of possibilities that researchers and practitioners have when designing and implementing social norm interventions to change the behavior of people in real-world settings.

The variety of interventions included in the sample speaks about the popularity of the social norm approach to tackle a wide variety of social issues and policy challenges [11], most of which are directed towards increasing the social and environmental sustainability of their target contexts. Although our sample includes studies that address 11 types of target behaviors in 12 types of participants and 16 countries, there are also clear patterns in it. Namely, the majority of the studies focus on healthy behavior (mainly reducing alcohol consumption) followed by pro-environmental behavior, are applied among students in the U.S. from 2010 onwards, and are applied remotely using group summary information messages. Most studies use only self-reported measures to assess behavioral changes (surveys where participants report their own behavior), and do so only 6 months or less after the intervention was finished.

But despite their common objective of influencing normative perceptions to test changes in behavior, the studies in our sample used very different intervention strategies. These differences pertained to some of the most essential aspects of interventions, including the context in which they were applied (situated versus remote) and the types of normative information leveraged (group summary information versus personal exposure to behaviors and opinions). And while most studies are not particularly clear and don't give enough details about these dimensions, or about why they chose one rather than the other (or a combination of them), as we have shown these options can be traced to rather different assumptions about human psychology and behavior (and in practice, very different applications).

On the one hand, dimension 1 represents a very old debate in psychology and in the social sciences in general, which broadly pertains to the degree in which factors that are external (such as the physical and social environment) or internal (such as representations, competences or emotions) to individuals can predict behavior (and can thus be influenced and changed). This sends back to the classic notions of locus of control, and also to the fundamental attribution error (the bias towards attributing someone's behavior to personality characteristics rather than to the context—see Ross ([116], pp. 173–220). As noted above, we know that several types of factors coalesce in situation to produce behavior. Unsurprisingly, interventions included in our sample have focused on different aspects of the three layers of installations to achieve behavioral changes, some leaning more towards changing the material and social environments in which behavior happens, and others relying more on transforming internal perceptions in the hope that this will influence future behavior. In practice, the strategy used in social norm interventions can try to make the norm salient in context (situated) by modifying the environment, or to change the individual representation of the norm remotely, “in general”, therefore focusing on embodied competences. Implicitly, this addresses one or the other (external or internal) locus of control.

On the other hand, dimension 2 represents the differentiation between sharing summary information about a group and direct social interaction that exposes participants to the behavior and opinions of others (likely involving more emotions since that is a multimodal experience). Social regulation, and the norms through which it is often expressed, sometimes works through summaries we receive about how groups behave or what are their opinions. But most often, it is also supported and works through everyday social interactions [27,112]: by hearing the opinions of others, by seeing or hearing stories about how they have behaved or would behave in certain situations, and also by learning the efforts they are making to change the behaviors and opinions of others. Direct interaction matters in communication. Where English has only one term, “communication”, Russian distinguishes *kommunikatsia* and *obschenie* (общение). *Kommunikatsia* (коммуникация) refers to an exchange of information, a notion that is familiar. *Obschenie*, which has no English equivalent, characterizes a specific field of research in Russian psychology. This term incorporates several meanings of the notion of “communication” as, for example, “human relations”, “interaction between individuals”, “pooling” and, finally, “sharing” in the religious sense [117]. While the interventions we subsumed under the term “group summary information” are mostly on the level of *kommunikatsia*, the others (“exposure to behaviors and opinions”) involve some elements of *obschenie* as the group is made more salient.

In a similar manner to what happens with dimensions, many studies fail to explain why they chose to apply a certain intervention mechanism and not others, and they don't describe in detail which ones and in which ways they were used. Through the 16 mechanisms that we have identified, researchers often influence different physical, psychological and social determinants of behavior in order to support the desired changes. Because of this, in order to advance the understanding of social norm interventions and the possibility of ever creating a reliable framework to design interventions that can effectively inform relevant policy challenges, it is critical to distinguish if, for example, in addition to normative information an intervention gave tips and guides for action rather than general information about the benefits of a change, and if participants accessed this information by reading a formal email or watching a funny video, and why these choices were made. Just as with intervention

dimensions, the particular mechanisms used can create very different practical interventions and might even determine their efficacy in particular contexts.

Rather than using a coherent framework to choose and describe interventions, the studies in our sample use a very wide variety of combinations between the different dimensions and mechanisms we have described (to the point that very few interventions use exactly the same configurations in our aspects of interest). Nevertheless, our analysis of correspondence between these elements revealed two main groups. One is much more common, especially from the year 2001 onwards, and consists on “lighter” interventions that use remote group summary information in digital platforms (and that typically target alcohol consumption and other health-related behaviors among students and employees). The other, less common and more frequently used from 1991 to 2000, uses more complex situated interventions based on exposure to behaviors and opinions through a wider range of mechanisms that include collective discussions, providing context information and tips for action, modifying local environments, and distributing papers and objects (to target mainly pro-environmental and harassment behaviors).

While the opposition between these two groups could maybe be traced to the increasing use of information and communication technologies for research and intervention purposes [118], as well as the increasing popularity of the Personalized Normative Feedback approach to tackle alcohol consumption in U.S. universities [23], they also seem to suggest a preference in the literature towards interventions that are simpler, easier and cheaper to apply, and that are based on information rather than on interaction. But despite the limited size of the group of studies that measured actual behavior (rather than using self-reported measures), we also presented some initial indications that, at least in our sample, the second group of more complex interventions (situated/EBO) could be more likely to produce relevant effects on behavior than the lighter ones (remote/GSI). Although this cannot be interpreted as an indication that situated/EBO interventions should always be chosen to tackle policy initiatives, we do believe that this expresses a need to a more serious consideration in both research and policy initiatives of this type of interventions.

Unfortunately for this endeavor, as we already reported, over two-thirds of the studies in our sample used self-reported measures of behavior only to assess their efficacy (in most cases, the answers of participants asking for the “frequency in which you engage” in the target behavior, collected in surveys applied before and after the intervention). But while this might be a good measure of the intervention’s success in changing the perceived social desirability of the target behavior, or how salient it is for them when recalling their activities, there is no guarantee that actual behaviors were changed. Because of this, we also believe that a more intensive application of remote/GSI interventions that use measurements of actual behaviors is needed to assess their real efficacy.

How to Design more Integral and Sustainable Interventions based on Social Norms: “Get Closer”

Most policy challenges are behavioral or have a strong behavioral dimension. Because of that, the success of policy interventions depends on achieving sustainable changes in the way people act. Behavioral change interventions based on social norms are an increasingly popular way to achieve this. Nevertheless, as we have presented in this paper, there is a wide variety of different types of interventions that can be applied to this end, and there are also many examples of interventions that were unsuccessful to transform behavior (see for example in our sample Lewis et al. [119], Moore et al. [84], or Werch et al. [120]).

Despite the fact that many researchers limit themselves to exploring the conceptual and research dimensions of behavioral change interventions, there are also some that have focused on how the practical design and implementation processes of social norm interventions can be improved. These researchers have made important arguments such as the usefulness of using marketing segmentation of participants [55,121] and of the involvement of participants and stakeholders in intervention procedures [27,122,123]. In our sample, Spijkerman and colleagues [124] have shown how social norm interventions can be effective only among certain populations but not others (specifically, their

intervention to reduce alcohol consumption reduced drinking only among binge drinkers, but not among their general sample).

The issues of how it is necessary to check if there is some consensus (declared or implicit) for the need to change before applying an intervention [57], how the research methods applied before interventions affect behavior [125], how the effects of individual level interventions or those that are applied on a single occasion quickly decay [68,126], and the importance of messages being credible and relevant [23], have also been discussed. In our sample, a failed alcohol intervention by Thombs et al. [127] led to the realization that most participants didn't find the campaign messages credible and didn't understand the intended purpose of the campaign.

By providing an overview of how these interventions have been applied, we do not mean to imply that what has been done in the literature should be blindly copied, or even that it is the best way to go. Rather, by providing a broad view of the mechanisms that have been used in these types of interventions, we hope to enlarge and shed some light on the range of possibilities that researchers and practitioners have when implementing interventions.

In this sense, although testing which of the four quadrants described above are more effective is difficult, real-world policy initiatives should not limit themselves to the remote-information-type interventions that seem to be so popular in the literature. Although usually easier to apply and research, these interventions often fail to take into account and leverage the rich variety of ways in which social regulation can influence behavior. In real world contexts, social norms are transmitted and enforced in much more varied ways than through group summary messages. Rather, social norms are supported through a wide variety of interaction processes: by seeing others behave in certain ways, by hearing their opinions and stories, by receiving instructions or feedback about the "correct" way to behave, by having physical artefacts that support or constraint our behavior or remind us of certain norms, and also by using the competencies and internalized norms we have acquired.

We argue that more effective and sustainable interventions can be achieved by combining the advantages of the different quadrants, mechanisms and applications we have described in this text. While remote interventions often allow a greater access and attention of participants, situated interventions modify the contexts where behaviors actually happen and allow participants to enact the new behaviors. And while group summary information allows correcting normative misperceptions and gives clear normative trends, exposure to behavior and opinions allows demonstration and interaction with social actors. Table 5 below provides a summary of some of the main dimensions and mechanisms that should be taken into account when designing a social norm intervention (for a detailed guide on how to prepare, implement and evaluate a social norm intervention for an applied policy challenge (improvement of domestic work conditions), see Yamin and Hobden [128]).

Table 5. Dimensions and mechanisms to create behavioral change interventions based on social norms.

Situating Interventions	
Group summary information (Q. II)	Exposure to behaviors and opinions (Q. I)
Create marketing material with group summary information to be distributed in the same context where the target behavior happens [24]	Create actions and/or provide objects in the same context in which the behavior happens that make visible (see [35,85,111]):
Include credible and strategic messages with the rates of prevalence and support that the target behavior (or related ones) have in a certain population (i.e., if you want to reduce drinking rates among students, show how most of them drink less, or that more disapproved heavy drinking, than usually thought [129])	<ul style="list-style-type: none"> ■ Other's opinions (i.e., online forums, face-to-face interactions to discuss opinions) ■ Other's behavior (i.e., theatre skits and videos with personal experiences) ■ Other's change initiatives (i.e., public demonstrations and norm enforcement)
Choose strategically the marketing materials that are more likely to be seen and remembered by the highest possible number of participants (i.e., posters, fliers, signs, stickers, adds, etc. [111,130,131])	

Table 5. Cont.

Remote Interventions	
Group summary information (Q. III)	Exposure to behaviors and opinions (Q. IV)
<p>Create marketing materials with group summary information to be distributed away from the context where the behavior happens (see guidelines in quadrant I)</p> <p>Benefiting from easier access and targetability, consider:</p> <ul style="list-style-type: none"> ■ Providing personalized feedback to the participants about their own behavior and opinions, and how they compare to the ones from the reference group [132] ■ Creating interaction or reflection processes around the normative information shared (such as discussions, forums and other activities [98,133]) 	<p>Create actions and/or provide objects away from the context in which the behavior happens to make visible [90,92]:</p> <ul style="list-style-type: none"> ■ Other's opinions (i.e., collective discussions and forums to discuss opinions) ■ Other's behavior (i.e., theatre skits and videos with personal experiences) ■ Other's change initiatives (i.e., public endorsements and campaign information)
Other Support Mechanisms	
<p>Depending on the intervention contexts and target behaviors, as well as the available resources, consider complementing the intervention with mechanisms such as:</p> <p>Providing objects or modifying physical environments in ways that make the target behavior easier or more likely (such as bikes or water bottles [17,85])</p> <p>Arranging external law and policy enforcement of the target behavior, or creating situations and providing materials that allow participants to regulate each other [6,134]; this can be enforced by policing personnel or by fellow citizens through the "vigilante effect" [27] (pp. 140–144)</p> <p>Creating digital and other forums to discuss normative information and provide mutual support [85]</p> <p>Providing factual and context information, and tips and guides for action [37,135]</p> <p>Generating discussions between participants about any aspects of the target behavior and change, including but not limited to the normative ones [35,98,129]</p> <p>Implementing training and skills building processes that support the target behavior [35,93,136]</p> <p>Setting goals or creating commitments to action (such as contracts or symbolic vaccination activities [6,95])</p> <p>Providing financial incentives or penalties compatible with the target behavior [6,21,137]</p> <p>In special cases, providing psychological therapy [96]</p>	

5. Limitations and Further Research

As with all literature reviews, our study has several limitations that would benefit from further research efforts. First, regarding our search design and inclusion criteria, although we used broad terms for our search (or because of this), we also had to choose to limit our search to the title of articles only. This was a methodological choice to get a varied yet manageable sample, but further research could include abstracts in the search (as many systematic reviews do [96] but which in our sample yielded more than 40,000 initial hits), as well as limiting thematically, methodologically or in some other way the sample. This meant that our sample left out some landmark studies that did not strictly fulfil our search criteria, and might also explain (although that is debatable) why our final sample had a large representation of similar studies (i.e. computer-delivered health interventions targeted at students, often North American). This bias, already highlighted above, is inherent to the published literature and likely reflects what type of intervention studies get more easily published. Nevertheless, it remains a limitation. Also, because of the difficulty of getting full digital texts and because of the resources we had, we chose to only select studies which had an English language abstract and that were not in books, dissertations, posters or research protocols. We also did not conduct searches of grey literature at this time, which undoubtedly contains very rich and relevant information.

Although we acknowledge that all these decisions limited the representativeness of the studies in our sample among the total population, it did allow us to obtain a diverse yet manageable sample to fulfil the objectives of our in-depth study of methods. Furthermore, we also completed our sample by conducting backward and forward searches, and we contacted expert and relevant authors to enquire for unpublished studies. Our sample, in this sense, did allow us to get a good grasp on how the elements of interest are used in this kind of interventions, and we do not think that the central tendencies we found are radically different to those of the general set of comparable interventions. Other researchers, depending on their objectives, should reflect on the best arrangements to balance the always problematic relationship between available resources, representativeness and variety of the sample, all according to their needs.

Another limitation in our review comes from the amount of information available in the studies. Many articles lacked sufficient details in their procedures for us to tease apart clearly the intervention procedures, messages (including, for example, if descriptive or injunctive norms were used) and context they used. In this respect, details that are rarely reported in academic articles (such as the specific messages used, the content of workshops and face-to-face interactions, or the times and places of some interventions), are crucial to fully understand how these elements were used in each case. A further study could indeed explore this in more detail by generating surveys for researchers or collecting detailed research protocols.

Finally, the logical next step is to research how the manipulation of the elements of interests in our study can be related to the effects of interventions on behavior. This, for us, is a second and more complicated step that requires a careful design and a different sample to the one we have used. Such a sample would have to manage the difficulties derived from issues such as the quality of the selected studies, their internal and external validity, and the great variety of target behaviors, types of participants, contexts and measures social norm interventions in the literature display, as well as the lack of detailed information about intervention procedures and their mixed use of different strategies and mechanisms. This could be done both through meta-analyses or field experiments, but would likely require a greater focus on specific areas, target behaviors and even dimensions and mechanisms. In our case, as already argued, we opted for a broader and more varied sample that would first allow us to describe and understand some of the dimensions involved and their associations.

6. Conclusions

In this paper, we have collected a wide systematic sample of empirical studies to explore the practical strategies and mechanisms through which researchers have leveraged normative information to achieve behavioral changes in real-world contexts. Specifically, we described key differences in terms of the context of application of the interventions, the types of normative information leveraged, and the physical, psychological and social mechanisms used to support the changes. Mainly, we highlighted two strategic dimensions in intervention design using social norms: situated or remote, and transmitting normative information through group summary information or exposure to behaviors and opinions. And based in our results, we also provided some of the elements that should be taken into account to design more integral and sustainable interventions.

Overall, we have underlined and argued in favor of the wide range of ways in which normative information can be leveraged to change behavior in the real world. Indeed, while some interventions and procedures are clearly easier to implement and test in academic studies (and to publish), if we want to advance the practical, real-world effectiveness of social-norm interventions we have to make an effort to explore more diverse and complex interventions (such as the ones done in a situated manner and using EBO), and to improve the way we report and measure the behavioral impact of our interventions. That is because in the real world of action, behavior is determined not just by the agent's will, but also by three layers of determinants in the socially constructed "installation" that funnels and scaffolds behavior: the agents' beliefs and competences indeed, but also the context's material affordances and the social control [27]. The closer to the installation the intervention is, the

more efficient it is. Famous photographer Robert Capa used to say: “if your photographs aren’t good enough, you’re not close enough” [138]. The same seems to apply to intervention: the closest to the actual action, and the closest to the social pressure, the better.

Through this paper, we hope to contribute to the general understanding of how these elements have been and can be included in real-world behavioral change interventions based on social norms, as well as their relevance both to research and practice. It is our hope that by extending our understanding of these factors, we will inform the application of more effective and sustainable interventions to tackle some of the collective challenges that societies and environments all over the world are facing. For practitioners and administrators everywhere, this can mean tapping into a huge potential for much needed real-world change.

Supplementary Materials: The following are available online at <http://www.mdpi.com/2071-1050/11/20/5847/s1>; Table S1: Full coded set of studies, Figure S1: MCA Output, Figure S2: MCA coordinate plot.

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Appendix A

Table A1. List of studies selected for the review.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
1	[94]	Agha and Van Rossem	2004	Impact of a school-based peer sexual health intervention on normative beliefs, risk perceptions, and sexual behavior of Zambian adolescents.	Zambia	Sexual health/HIV
2	[95]	Balvig and Holmberg	2011	The ripple effect: A randomized trial of a social norms intervention in a Danish middle school setting.	Denmark	Health behavior
3	[33]	Bateson et al.	2013	Do images of “watching eyes” induce behaviour that is more pro-social or more normative? A field experiment on littering.	UK	Pro-environmental
4	[137]	Bauer et al.	2017	Financial Incentives Beat Social Norms: A Field Experiment on Retirement Information Search.	Netherlands	Tax and retirement

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
5	[139]	Bertholet et al.	2016	Are young men who overestimate drinking by others more likely to respond to an electronic normative feedback brief intervention for unhealthy alcohol use?	Switzerland	Alcohol
6	[37]	Bewick et al.	2013	The effectiveness of a Web-based personalized feedback and social norms alcohol intervention on United Kingdom university students: Randomized controlled trial.	UK	Alcohol
7	[109]	Bewick et al.	2008	The feasibility and effectiveness of a web-based personalised feedback and social norms alcohol intervention in UK university students: A randomised control trial.	UK	Alcohol
8	[140]	Boen et al.	Unpublished	Portraying role models to promote stair climbing in a public setting: The effect of matching sex and age	Germany	Health behavior
9	[88]	Boyle et al.	2017	PNF 2.0? Initial evidence that gamification can increase the efficacy of brief, web-based personalized normative feedback alcohol interventions.	U.S.	Alcohol
10	[135]	Brent et al.	2017	Are Normative Appeals Moral Taxes? Evidence from A Field Experiment on Water Conservation	U.S.	Pro-environmental
11	[136]	Bruce and Keller	2007	Applying Social Norms Theory within groups: Promising for high-risk drinking.	U.S.	Alcohol
12	[80]	Brudermann et al.	2017	Eyes on social norms: A field study on an honor system for newspaper sale.	Austria	Integrity - morality
13	[40]	Celio and Lisman	2014	Examining the efficacy of a personalized normative feedback intervention to reduce college student gambling.	U.S.	Gambling
14	[38]	Chernoff and Davison	2005	An evaluation of a brief HIV/AIDS prevention intervention for college students using normative feedback and goal setting.	U.S.	Sexual health / HIV
15	[141]	Cleveland et al.	2013	Moderation of a parent-based intervention on transitions in drinking: Examining the role of normative perceptions and attitudes among high- and low-risk first-year college students.	U.S.	Alcohol

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
16	[142]	Collins et al.	2002	Mailed personalized normative feedback as a brief intervention for at-risk college drinkers.	U.S.	Alcohol
17	[143]	Collins et al.	2014	Randomized controlled trial of web-based decisional balance feedback and personalized normative feedback for college drinkers.	U.S.	Alcohol
18	[87]	Cross and Peisner	2009	RECOGNIZE: A social norms campaign to reduce rumor spreading in a junior high school.	U.S.	Bullying / harassment behavior
19	[144]	Cunningham and Wong	2013	Assessing the immediate impact of normative drinking information using an immediate post-test randomized controlled design: Implications for normative feedback interventions?	Canada	Alcohol
20	[96]	Davis et al.	2016	Brief Motivational Interviewing and Normative Feedback for Adolescents: Change Language and Alcohol Use Outcomes.	U.S.	Alcohol
21	[145]	Dejong et al.	2006	A multisite randomized trial of social norms marketing campaigns to reduce college student drinking: A replication failure.	U.S.	Alcohol
22	[146]	Doumas and Hannah	2008	Preventing high-risk drinking in youth in the workplace: A web-based normative feedback program.	U.S.	Alcohol
23	[147]	Doumas et al.	2010	Reducing heavy drinking among first year intercollegiate athletes: A randomized controlled trial of web-based normative feedback.	U.S.	Alcohol
24	[148]	Doumas et al.	2011	Reducing high-risk drinking in mandated college students: Evaluation of two personalized normative feedback interventions.	U.S.	Alcohol
25	[17]	Flüchter et al.	2014	Digital commuting: The effect of social normative feedback on e-bike commuting - Evidence from a field study.	Switzerland	Pro-environmental
26	[36]	Gidycz et al.	2011	Preventing sexual aggression among college men: An evaluation of a social norms and bystander intervention program.	U.S.	Bullying / harassment behavior

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
27	[64]	Hallsworth et al.	2016	Provision of social norm feedback to high prescribers of antibiotics in general practice: a pragmatic national randomised controlled trial.	UK	Health behavior
28	[149]	Hartwell and Campion	2016	Getting on the same page: The effect of normative feedback interventions on structured interview ratings.	U.S.	Rating of interviews
29	[19]	Hopper et al.	1991	Recycling as altruistic behavior: Normative and Behavioral Strategies to Expand Participation in a Community Recycling Program.	U.S.	Pro-environmental
30	[150]	Howe et al.	Unpublished	Normative Appeals Are More Effective When They Invite People to Work Together Toward a Common Cause	U.S.	Pro-environmental
31	[93]	Kearney et al.	2013	The impact of an alcohol education program using social norming.	U.S.	Alcohol
32	[151]	Koeneman et al.	2017	A novel method to promote physical activity among older adults in residential care: An exploratory field study on implicit social norms.	Netherlands	Health behavior
33	[16]	Kormos et al.	2015	The Influence of Descriptive Social Norm Information on Sustainable Transportation Behavior: A Field Experiment.	Canada	Pro-environmental
34	[152]	Kulik et al.	2008	Social norms information enhances the efficacy of an appearance-based sun protection intervention.	U.S.	Health behavior
35	[153]	Labrie et al.	2009	A brief live interactive normative group intervention using wireless keypads to reduce drinking and alcohol consequences in college student athletes.	U.S.	Alcohol
36	[85]	Lahlou et al.	2015	Increasing water intake of children and parents in the family setting: a randomized, controlled intervention using installation theory.	Poland	Water intake
37	[24]	Lapinski et al.	2013	Testing the Effects of Social Norms and Behavioral Privacy on Hand Washing: A Field Experiment.	U.S.	Health behavior
38	[90]	Latkin et al.	2013	The dynamic relationship between social norms and behaviors: the results of an HIV prevention network intervention for injection drug users.	U.S.	Sexual health / HIV

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
39	[154]	Lewis, and Neighbors	2006	An Examination of College Student Activities and Attentiveness During a Web-Delivered Personalized Normative Feedback Intervention.	U.S.	Alcohol
40	[119]	Lewis et al.	2008	21st Birthday Celebratory Drinking: Evaluation of a Personalized Normative Feedback Card Intervention.	U.S.	Alcohol
41	[132]	Lewis et al.	2014	Randomized controlled trial of a web-delivered personalized normative feedback intervention to reduce alcohol-related risky sexual behavior among college students.	U.S.	Alcohol
42	[155]	Lojewski et al.	2010	Personalized normative feedback to reduce drinking among college students: A social norms intervention examining gender-based versus standard feedback.	U.S.	Alcohol
43	[156]	Mattern and Neighbors	2004	Social norms campaigns: Examining the relationship between changes in perceived norms and changes in drinking levels.	U.S.	Alcohol
44	[39]	McCoy et al.	2017	Pilot study of a multi-pronged intervention using social norms and priming to improve adherence to antiretroviral therapy and retention in care among adults living with HIV in Tanzania.	Tanzania	Sexual health / HIV
45	[6]	Mockus	2002	Co-existence as harmonization of law, morality and culture.	Colombia	Pro-environmental—Use of pedestrian crossings
46	[92]	Mogro-Wilson et al.	2017	A Brief High School Prevention Program to Decrease Alcohol Usage and Change Social Norms.	U.S.	Alcohol
47	[20]	Mollen et al.	2013	Healthy and unhealthy social norms and food selection. Findings from a field-experiment.	U.S.	Health behavior
48	[157]	Mollen et al.	2013	Intervening or interfering? The influence of injunctive and descriptive norms on intervention behaviours in alcohol consumption contexts.	Netherlands	Alcohol

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
49	[84]	Moore et al.	2013	An exploratory cluster randomised trial of a university halls of residence based social norms marketing campaign to reduce alcohol consumption among 1st year students.	UK	Alcohol
50	[158]	Moreira et al.	2012	Personalised Normative Feedback for Preventing Alcohol Misuse in University Students: Solomon Three-Group Randomised Controlled Trial.	UK	Alcohol
51	[89]	Neighbors et al.	2004	Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention.	U.S.	Alcohol
52	[159]	Neighbors et al.	2010	Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial.	U.S.	Alcohol
53	[160]	Neighbors et al.	2011	Social-norms interventions for light and nondrinking students.	U.S.	Alcohol
54	[41]	Neighbors et al.	2015	Efficacy of personalized normative feedback as a brief intervention for college student gambling: A randomized controlled trial.	U.S.	Gambling
55	[161]	Neighbors et al.	2006	Being controlled by normative influences: Self-determination as a moderator of a normative feedback alcohol intervention.	U.S.	Alcohol
56	[35]	Paluck and Shepherd H.	2012	The salience of social referents: A field experiment on collective norms and harassment behavior in a school social network.	U.S.	Bullying / harassment behavior
57	[22]	Payne et al.	2015	Shopper marketing nutrition interventions: Social norms on grocery carts increase produce spending without increasing shopper budgets.	U.S.	Health behavior
58	[162]	Pedersen et al.	2016	A randomized controlled trial of a web-based, personalized normative feedback alcohol intervention for young-adult veterans.	U.S.	Alcohol
59	[14]	Pellerano et al.	2016	Do Extrinsic Incentives Undermine Social Norms? Evidence from a Field Experiment in Energy Conservation.	Ecuador	Pro-environmental

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
60	[129]	Perkins and Craig	2006	A successful social norms campaign to reduce alcohol misuse among college student-athletes.	U.S.	Alcohol
61	[163]	Perkins et al.	2011	Using social norms to reduce bullying: A research intervention among adolescents in five middle schools.	U.S.	Bullying / harassment behavior
62	[111]	Perkins et al.	2010	Effectiveness of social norms media marketing in reducing drinking and driving: A statewide campaign.	U.S.	Alcohol
63	[25]	Pfattheicher et al.	Unpublished	A Field Study on Watching Eyes and Hand Hygiene Compliance in a Public Restroom	Germany	Health behavior
64	[98]	Prince et al.	2015	Development of a Face-to-Face Injunctive Norms Brief Motivational Intervention for College Drinkers and Preliminary Outcomes.	U.S.	Alcohol
65	[164]	Reid and Aiken	2013	Correcting injunctive norm misperceptions motivates behavior change: A randomized controlled sun protection intervention.	U.S.	Health behavior
66	[165]	Reilly and Wood	2008	A randomized test of a small-group interactive social norms intervention.	U.S.	Alcohol
67	[166]	Ridout and Campbell	2014	Using facebook to deliver a social norm intervention to reduce problem drinking at university.	Australia	Alcohol
68	[167]	Schultz and Tyra	Unpublished	Two Field Studies of Normative Beliefs and Environmental Behavior	U.S.	Pro-environmental
69	[15]	Schultz et al.	2016	Personalized normative feedback and the moderating role of personal norms: A field experiment to reduce residential water consumption.	U.S.	Pro-environmental
70	[168]	Schultz et al.	Unpublished	Normative Social Influence Transcends Culture, But Detecting It Is Culture Specific	Multiple	Alcohol
71	[18]	Schultz	1999	Changing behavior with normative feedback interventions: A field experiment on curbside recycling.	U.S.	Pro-environmental
72	[169]	Scribner et al.	2011	Alcohol prevention on college campuses: The moderating effect of the alcohol environment on the effectiveness of social norms marketing campaigns.	U.S.	Alcohol

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
73	[130]	Silk et al.	2017	Evaluation of a Social Norms Approach to a Suicide Prevention Campaign.	U.S.	Counselling service use
74	[131]	Smith et al.	2006	A social judgment theory approach to conducting formative research in a social norms campaign.	U.S.	Alcohol
75	[124]	Spijkerman et al.	2010	Effectiveness of a Web-based brief alcohol intervention and added value of normative feedback in reducing underage drinking: A randomized controlled trial.	U.S.	Alcohol
76	[170]	Stamper et al.	2004	Replicated findings of an evaluation of a brief intervention designed to prevent high-risk drinking among first-year college students: Implications for social norming theory.	U.S.	Alcohol
77	[171]	Steffian	1999	Correction of normative misperceptions: An alcohol abuse prevention program.	U.S.	Alcohol
78	[172]	Su et al.	2017	Evaluating the Effect of a Campus-wide Social Norms Marketing Intervention on Alcohol Use Perceptions, Consumption, and Blackouts.	U.S.	Alcohol
79	[173]	Taylor et al.	2015	Improving social norms interventions: Rank-framing increases excessive alcohol drinkers' information-seeking.	UK	Alcohol
80	[174]	Thombs et al.	2007	Outcomes of a technology-based social norms intervention to deter alcohol use in freshman residence halls.	U.S.	Alcohol
81	[127]	Thombs et al.	2004	A close look at why one social norms campaign did not reduce student drinking.	U.S.	Alcohol
82	[21]	Thorndike et al.	2016	Social norms and financial incentives to promote employees' healthy food choices: A randomized controlled trial.	U.S.	Health behavior
83	[134]	Toghianifar et al.	2014	Women's attitude toward smoking: effect of a community-based intervention on smoking-related social norms.	Iran	Health behavior

Table A1. Cont.

No.	Reference	Author(s)	Year	Title	Country	Intervention Topic
84	[133]	Turner et al.	2008	Declining negative consequences related to alcohol misuse among students exposed to a social norms marketing intervention on a college campus.	U.S.	Alcohol
85	[81]	Wall and Cameron	2017	Trial of Social Norm Interventions to Increase Physical Activity.	U.S.	Health behavior
86	[175]	Wegs et al.	2016	Community Dialogue to Shift Social Norms and Enable Family Planning: An Evaluation of the Family Planning Results Initiative in Kenya.	Kenya	Sexual health/HIV
87	[176]	Wenzel	2005	Misperceptions of social norms about tax compliance: From theory to intervention.	Australia	Tax and retirement
88	[120]	Werch et al.	2000	Results of a social norm intervention to prevent binge drinking among first-year residential college students.	U.S.	Alcohol
89	[91]	Yurasek et al.	2015	Descriptive Norms and Expectancies as Mediators of a Brief Motivational Intervention for Mandated College Students Receiving Stepped Care for Alcohol Use.	U.S.	Alcohol

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5. Study 2: A qualitative study to analyse the narratives that key policy actors share about Mockus' interventions

This section contains the current version of Paper 2 of the project, which as described in Section 3.2.2 is a qualitative study about the main characteristics and the role of the narratives that key policy actors share about Mockus' interventions. As specified above, we collected narratives from 117 citizens, 80 press articles and 4 designers of the original interventions to analyse their content and structure in terms of their main themes, characters, and the plots and morals they present.

This study and the findings were framed to inform the research and practice around behavioural policy interventions in urban contexts. We argue that understanding the narratives that policy actors have around an intervention is essential to understand its reception and impact, especially when its objective is to influence the behaviour of people. Managing these narratives (for example, by providing information on key aspects citizens care about) should be a priority for policy makers. The paper is presented here in its most recent publishable draft version, which will be further adjusted and submitted to a journal in the policy or urban studies fields in the near future.

Three co-authors took part in this study:

- Professor Saadi Lahlou, my supervisor, helped with conceptualization and the design of the study, with the formal analysis, and provided feedback, insights and edits during the whole process.
- Santiago Ortega and Andrés Sáenz, innovation and policy experts and practitioners from Colombia, provided valuable support in the pre-testing of instruments and data collection processes in Bogotá and online. They also contributed to the manual coding and analysis of the narratives and provided edits to the final draft.

In terms of outreach, this research partially informed the consulting work with the International Labour Organization teams and it was presented in the 10th Asian Conference on Psychology & the Behavioral Sciences (ACP2020) in Tokyo, Japan (held virtually due to COVID-19 travel restrictions).

5.1. Paper 2: “The Power of Narratives in Behavioural Policy Interventions in the City: A Study of the Civic Culture Interventions of Antanas Mockus in Bogotá, Colombia”

THE POWER OF NARRATIVES IN BEHAVIOURAL POLICY INTERVENTIONS IN THE CITY:
A STUDY OF THE CIVIC CULTURE INTERVENTIONS OF ANTANAS MOCKUS IN BOGOTÁ,
COLOMBIA

Paulius Yamin

*London School of Economics and Political Science / Vilnius Gediminas Technical University /
Behavioural Lab LT*

Saadi Lahlou

London School of Economics and Political Science / Paris Institute for Advanced Study

Santiago Ortega

Secretaría de Desarrollo Económico, Alcaldía Mayor de Bogotá

Andrés Sáenz

Escuela de Administración, Universidad del Rosario

Abstract

Policy interventions that seek to transform the behaviour of city inhabitants in ways that benefit collective life are becoming more and more popular among city administrators (for example, to reduce water and energy consumption, encourage recycling or increase traffic norm compliance). The potential of these interventions to create behavioural changes in their target population is often determined by the narratives that citizens and other policy actors create and share around them.

In this paper, we focus on a specific, now classic, policy initiative (the mime-artist interventions of Antanas Mockus in Bogotá, Colombia), to illustrate how narratives are essential to understand how different policy actors understand and make sense of behavioural policy initiatives in the city. To do this, we collected narratives from 117 citizens, 80 press articles spanning over 24 years, and we interviewed some of the original designers of the intervention. Using automated textual analysis (Reinert, 1983, 1993; Schonhardt-Bailey et al., 2012) and manual coding of Narrative Policy Framework (Shanahan et al., 2011) categories, we analysed the content and structure of their narratives.

Our findings describe the main characteristics that structure the narratives of citizens and the press in this successful case, and which pertain to (i) their main themes, (ii) their main characters and their agency and (iii) the audience and their agency. We discuss the research and practical implications of these characteristics, with an emphasis on how narratives support the impact that the intervention had by allowing policy actors to make sense of it and by promoting collective self-observation, reflexivity and collective action around it. By doing this, we argue that good behavioural policy interventions create stories, and we propose seven recommendations that, based on this experience, could inform the design of more effective policy interventions to influence citizens' behaviours.

Keywords: narratives, behaviour, behavioural change, policy, city, civic culture, narrative policy framework, drama, reflexivity, installation theory, text mining.

“La vida no es la vida que uno vivió, sino la que uno recuerda y cómo recuerda para contarla”

[Life is not what you lived, but what you remember and how you remember to tell the tale]

Gabriel García Márquez (2003, p. 1)

INTRODUCTION

Interventions that apply insights from the psychological and behavioural sciences to transform the behaviour of citizens have become popular among city administrators (see Meeting of the Minds, 2020) to influence inhabitants in ways meant to benefit collective life, such as reducing water and energy consumption (Sánchez, 2012; Schultz et al., 2016), littering (Cialdini et al., 1990), violence (Ariza & Chiappe, 2012; Paluck & Shepherd, 2012), increasing recycling (Schultz, 1999) or compliance with traffic norms (Mockus, 2002). Because of the focus of behavioural interventions on the everyday actions of people (instead than on abstract rules and procedures), an increasing number of officials from all levels of government are realizing their potential to boost the efficacy of more conventional policy and legislative initiatives (see Müller-Eie & Bjørnø, 2017; Newman, 2010).

A paradigmatic case of behavioural interventions in urban contexts (which have been recently discussed in length in a Harvard University Press volume, see Tognato, 2018, pp. 25–68), are the civic culture initiatives applied by Mayor Antanas Mockus in Bogotá, Colombia. In his two terms as Mayor of the 7-million-people capital of the country (from 1995 to 1997 and then from 2001 to 2003), Mockus applied unusual behavioural change interventions using mime-artists “to bring order on Bogotá’s chaotic traffic, [or] so-called days of [symbolic] inoculation against violence” (Tognato, 2017), which contributed to achieving results that are rarely seen in these domains: in 11 years (from 1993 to 2004), homicides decreased by 70% (Melo, 2012), deaths in traffic accidents by 65% (Sánchez, 2012), and per capita water consumption by 46% (Murrain, 2012), to name a few¹⁹.

A defining feature of these interventions is how the narratives that people created about them transformed discrete actions that were seen directly by a few hundred people, into stories that many of the inhabitants of this 7-million-people capital still remember. Previous research, policy analysis and political commentary has highlighted the importance of the narratives created and

¹⁹ See Sommer (Sommer, 2006) Mockus (2002; Mockus et al., 2012), Yamin (Yamin, 2013) and Tognato (2017) for examples of the specific interventions performed and their results.

shared by citizens and the press around Mockus' interventions (Martin-Barbero, 2017, pp. 279–285; Mockus, 2017, p. 611), but these narratives have never been empirically and systematically researched. In this paper, we present a case study and commentary of a specific, now classic, policy initiative to illustrate how narratives are essential to understand policy interventions that seek to influence the behaviours of city inhabitants, and how they play an important role in supporting their reach and effectiveness. By exploring the particularities that such narratives have taken among key policy actors, our main argument is that good behavioural policy interventions create stories. And good stories, as the case of Mockus' interventions shows, can transform a discrete initiative into stories that millions of city inhabitants can still recount more than 20 years after their application.

To do this, we collected the narratives that relevant groups of actors have around the mime-artist intervention, one of the most famous and well-remembered of Mockus' initiatives. Specifically, we collected, compared and analysed narratives by the citizens of Bogotá (conceptualized as the targets of the intervention), the written press (which commented and spread information about the intervention), and some of the original designers of the interventions (which devised and implemented them). By analysing the contents of these narratives, we can compare how different types of actors understand and make sense of this policy initiative and its results.

After an introduction to the chosen policy context and the approach we use to understand it, we present a summary of our data collection and analysis methods. Then, we present the results of our analysis about the content and structure of the narratives, and we discuss the research and practical implications of their main characteristics. Finally, we present seven recommendations to inform the design of urban policies that attempt to change citizen behaviour.

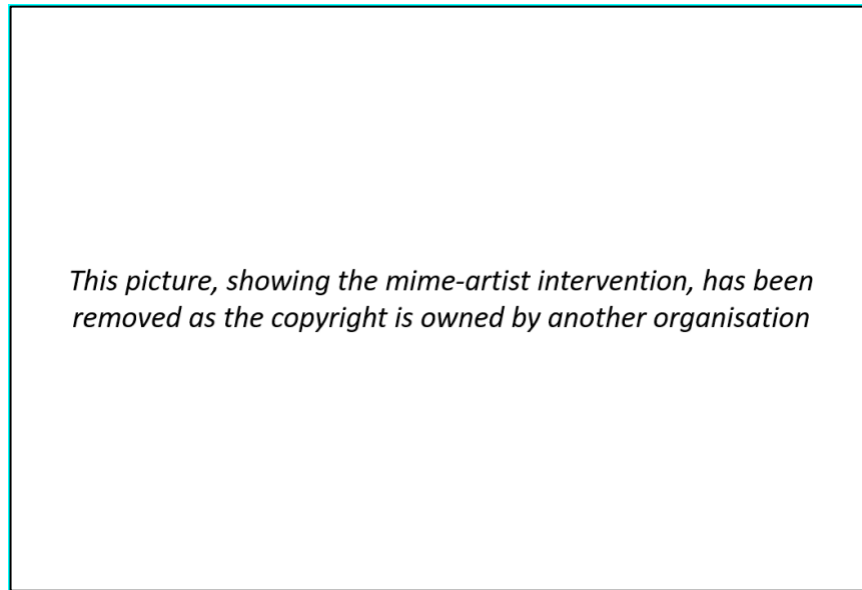
The context: the civic culture interventions of Antanas Mockus

Antanas Mockus was first elected Mayor of Bogotá in 1994. During both of his terms (1995-97 and 2001-03), he used behavioural change interventions to influence social norms and foster mutual regulation in the city (an approach known as "*cultura ciudadana*" - "civic culture"). Through cultural and artistic motifs (such as mime-artists, see Sommer, 2006, p. 2), Mockus sought to create reflections around social problems and to promote civic engagement with them (Mockus, Murraín, & Villa, 2012; Yamin, 2013). Rather than using only rational arguments or prohibitions (as many policy initiatives do), these interventions leveraged the idea that art, "humour and playfulness" are the "most powerful tool[s] for change we have" (Mockus, 2015).

Using these methods, one of the main objectives that his interventions aim to achieve is to expose and challenge the perceptions of citizens around what are the typical and desirable behaviours in a certain situation (Tankard & Paluck, 2016). This includes traffic regulations and the use of support infrastructure such as crosswalks: if people believe that complying with them is not typical and is not considered acceptable, they will be less likely to use them. This is the definition of social norms, a topic that has been central to social-psychological research for a long time (see Allport, 1920; Asch, 1952, p. 457, 1955; Sherif, 1936), and which are essential because they can often play an important role on how we behave, on how we perceive social situations, on how we relate and interact with others, and on even on our membership and place in a group (Sherif, 1965, pp. 1–5). Social norms often express collective consensuses (Paluck & Shepherd, 2012) and are often enforced by other people rather than authorities. According to Tankard and Paluck (2016), there are three main sources that people use to gather information about what is considered to be typical and desirable in a certain situation: the individual behaviours they see in others, the summary information they sometimes get (for example in surveys or official data), and the signals that different institutions send. Because social norms are often built from perceptions that are informed by these three sources, and because of the influence they have on the behaviour of people, understanding and leveraging the narratives that are created around them can be essential.

A few months after Mockus began his first period as mayor (in March 1995), Bogotá's Mayor's Office hired a group of 20 mime-artists with the specific mission of getting citizens to comply with traffic norms (El Tiempo, 1995a). The specific behaviour that was chosen was the use of crosswalks on the part of pedestrians and drivers. For over a month, the group worked in a few intersections of one of the city's most iconic streets and eventually, 3,200 allegedly corrupt traffic policemen were dismissed, while 200 mimes were trained by the initial group and sent to different neighbourhoods (El Tiempo, 1995e; Jaramillo, 2010). In total, the campaign "was carried out at 482 intersections with the participation of 425 people (mimes, police officers, etc.)" (Falconi, 2017, pp. 85–86). Although mime-artists could not issue traffic tickets, they mocked those that did not comply with traffic norms and congratulated those that did: according to the Mayor, "Colombians fear ridicule more than punishments" (Jaramillo, 2010).

Image 1. The mime-artist intervention



Source : <https://images.app.goo.gl/9RAMMF8UsvF9iXFq8>

One of the original press articles that first described the intervention, and that we collected in the sample of this paper, reads:

“MIME-ARTISTS MADE EVERYTHING VISIBLE

EL TIEMPO Editorial Office - 9 March 1995

In the 11 blocks between the 3rd Avenue and the Caracas Avenue in the 19th Street, nothing went unnoticed yesterday: nor contravening citizens, nor authorities that preach but don't apply, nor the dire state of pavements.

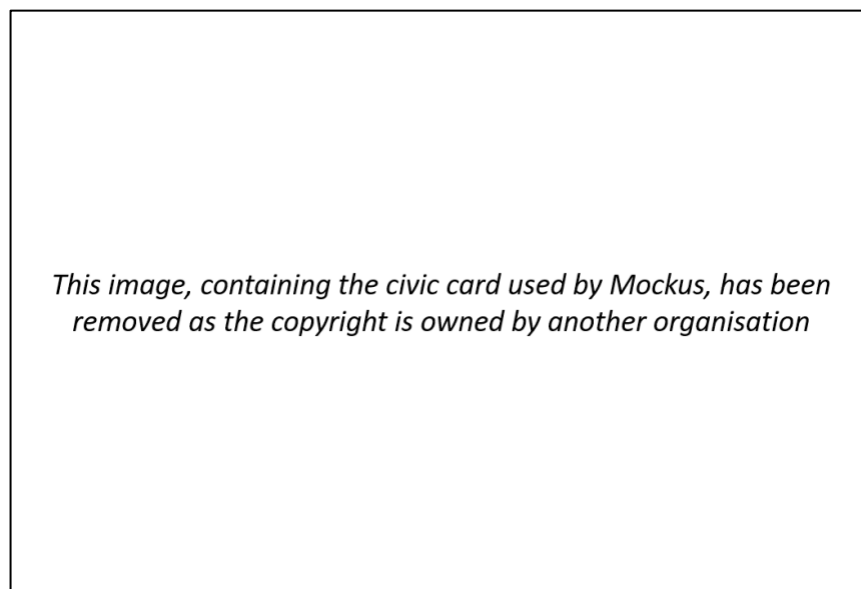
Everybody had something to do with the twenty mime-artists that took on the streets yesterday. Some took time to stop and watch them (including cars), some street vendors like María Buitrago complained because everybody was too busy following the mime-artists to look at her goods, and yet others seemed to be running late and were not able to enjoy the civic game. What is certain is that their presence made everyone feel more aware of their own behaviour and of the deficiencies of the area's public spaces. For example, each time the mime-artists found a pothole or a puddle, they would stop as if faced with a big obstacle.

“It is like lighting a spotlight on each citizen that is normally concealed by anonymity”, explained Manuel Espinel, advisor for the Institute of Culture and Tourism, the institution in charge of the Citizen Culture program.

There was even a moment when the abuses of authorities also became evident, when the mime-artists began to simulate a run over with a white Ford van that was parked on the pavement of the 19th Street and the 13th Avenue. A police patrol with license 04-3284 asked them to stop the show because that was a car from the General Prosecutor's Office. Nevertheless, some wondered why the game wasn't also for them" (El Tiempo, 1995a).

Soon after, the mime artists started using "citizenship cards" with two sides: a white or green one with a "thumbs-up" to express approval and a red one with a "thumbs-down" to express disapproval (see Image 2 below).

Image 2. The Civic Card



Source: <https://images.app.goo.gl/UtTqi6rRuHenVrujZ>

Then, "hundreds of thousands" of cards funded by the water company and the private sector were distributed to pedestrians and drivers to encourage "positive interpersonal control" and regulation of "each other's behaviour through peaceful means" (Falconi, 2017, p. 127). Another original press article describes the cards in the following way:

"AS A CITIZEN, WHAT CARD DO YOU DESERVE"

EL TIEMPO Editorial Office - 16 March 1995

[...] In addition to roses, there will also be green cards. And each one will serve as a symbol of approval or disapproval, according to the type of citizen you're a part of.

In this way, the green side of the card (A) corresponds to the citizen that is a Titan, and that makes an effort to conquer the ideal city and inspires others with their enthusiasm for making it a reality. This will be used to express appreciation and support for the citizen-player who respects the traffic rules and behaves in a positive way with other citizens and with the public space, in this city that seems to interest no one, according to the definition of the District Institute of Culture and Tourism.

On the other hand, the uncouth people that do not allow the city to shine because they invade public space, they drive over pedestrian crossings, they dump garbage on the streets, etc., will be shown card B, with a red colour. This will be used as a kind of harmless warning to make them realize their bad behaviour and express displeasure and estrangement towards them.

At first, the people in charge of taking out the cards would be the mimes and the theatrical who are performing the games on 19th Avenue, but the idea is that then the citizens invent new cards to signify other situations" (El Tiempo, 1995c).

Unfortunately, the effects of these and other similar interventions carried out at the time were never systematically tested beyond what the official figures could express (such as the rates of homicides or deaths in traffic accidents for the whole city). Some restricted diagnoses found that the proportion of passengers that respected bus stops grew from 26% in 1995 to 38% in 1996, and that in 1996, 76% of drivers and 72% of pedestrians respected crosswalks (with no baseline reported – [Falconi, 2017]). But most impressively, even if only a few thousand people could have experienced a direct encounter with a mime-artist, at the end of Mockus' second term as Mayor the rate of deaths in traffic accidents for the whole city had declined by 65% (Sánchez, 2012). The interventions are widely regarded as successful and, 20 years later, most people in Bogotá have heard about them. Because of this, a critical aspect of the effectiveness that these interventions seemed to have might be tied to the narratives that were created and re-created around them (Martin-Barbero, 2017, pp. 279–285; Mockus, 2017, p. 611)²⁰.

Mockus' interventions and the reasons for their impressive results have been studied from a variety of different perspectives that include cultural and art theory, sociology, philosophy and public policy (see Elster, 2010, p. 104; Mackie, 2017; Sommer, 2006, p. 2; Tognato, 2017; Yamin, 2012). But despite this, empirical research that analyses the narratives around them from a psychological perspective has not been undertaken and could provide invaluable insights into their particularities and their success in transforming behaviour. The difficulty, of course, is that Mockus' interventions are unique examples of both urban policy and behavioural change interventions.

²⁰ Antanas Mockus, personal communication, 28th. August 2017.

Among the many aspects that can be used to describe them, one of the defining characteristics of Mockus' interventions is their use of "surprising" and "unexpected" elements (such as using mime-artists hired by the Mayor's office to regulate traffic). These interventions share this aspect with the classic "pique technique" that disrupts expectations with an unusual proposition (Lee & Feeley, 2017; Santos et al., 1994). But that is not all. Compared to more "traditional" urban policy interventions (like police enforcement, awareness campaigns or signs) or behavioural change interventions (like workshops or providing information), these are complex proposals. Their aim is to mobilize cultural and artistic motives (Sommer, 2006, p. 2) to promote reflections around social problems and collective engagement with them (see Mockus et al., 2012; Paluck & Shepherd, 2012; Yamin, 2013). In so doing, they aim to fulfil a similar purpose to drama and ritual, which are both forms on social interaction that strengthens and perpetuates social values, but that also disrupt, disintegrate, and transform them (Morgan & Brask, 1988, p. 175). In this sense, Mockus' interventions also resemble fairy tales, in the sense that "subtly, and by implication only, (they) convey(s) [...] the advantages of moral behaviour, not through abstract ethical concepts but through that which seems tangibly right and therefore meaningful" (Bettelheim, 1991, p. 5).

But on the other hand, as much as this might help to get people's attention and increase retention, it is not just *any* surprising act or artistic performance that creates an impact in citizen's everyday behaviours. Mockus' interventions are also successful because they influence local determinants of behaviour. This is best understood using Installation Theory (Lahlou, 2009, 2015, 2017, p. 140), which provides a clear and actionable framework to understand some of the wide variety of ways in which societies try to ensure compliance with expected behaviours among millions of people. According to it, the world is made of "specific, local, societal settings where humans are expected to behave in a predictable way" (Lahlou, 2017, p. 140). These settings are called installations (following the artistic term for patterns that assemble and modify our experiences of situations), and include, for example, classrooms, restaurants, or street intersections. Three main types of determinants assemble locally (at the point of delivery of the behaviour) to produce these expected behaviours: the objective physical environment (physical layer), the embodied interpretive systems (psychological layer) and social regulation (social layer). The socially constructed components of these layers guide and control behaviour, they channel it all along the way, just as a road both opens a way and constrains it; still the user, while following that path, simply experiences it as a natural way to reach her destination, without feeling guided or constrained. And because behaviour is determined by the three layers, interventions that only affect one of them have a higher chance of being ineffective or achieving small results. Rather, Installation Theory argues that intervention processes must redesign the three layers of local

determinants of behaviour (physical, psychological and social) and their interconnections to create sustainable changes in behaviour.

Mockus' interventions draw their power from creating an imbalance on the current configuration of those determinants using creative actions that are similar to the ones that Debord (1961) calls *situations*, Lefebvre (1991, p. 207) calls *moments*, and Benford (2013, p. 139) calls *dramatic acts*. In modern urbanized societies, everyday routines are full of debilitating boredom (see Highmore, 2002, p. 2) and fetishized images (see Debord, 1961) that empty time of all content and turn perception into an "unconsciously automatic" continuum²¹ (Shklovsky, 1965, p. 3). Installation Theory describes the resulting "channelled state" (Lahlou, 2017, p. 153) as one of the main ways in which installations produce appropriate and expected behaviour. While creating expected behaviours is essential for complex societies to work, these forces also make difficult for people to create transformations by reinterpreting and redesigning installations. Transforming the everyday performances described by Goffman (1959, pp. 28–82) is difficult. Questioning the current way of doing, the installation, requires the "unfreezing" stage described by Lewin (1947a, 1947b, p. 211). Life can offer alternative uses and reinterpretations (de Certeau, 1990), creative possibilities, mystery and passion. Through Debord's *situations* (1961), Lefebvre's *moments* (1991, p. 207) and Benford's *dramatic acts* (2013, p. 139), strangeness can be introduced in naturalized routines and meanings by exposing their arbitrariness. Through them, social movements can reframe "audiences' understandings of social reality" (Benford, 2013, p. 139). By breaking the ongoing process through which installations reproduce the embodied interpretive competences that "induce subjects into performing some specific behaviour appropriate to the installation" (Lahlou, 2017, p. 188), interventions seem to achieve the "unfreezing" effect that (cited above) sought to bring change. According to Lewin, in some cases this involved breaking "the shell of complacency and self-righteousness" by deliberately creating "an emotional stir-up" (Lewin, 1947b, p. 211). And it is these "surprising" situations that create compelling narratives that people are more likely to mock, interpret and share than, say, a regular traffic sign.

Taking all these elements into account, we argue that one of the main reasons Mockus' interventions might have been so effective at transforming behaviour, is because they combine intentional reconfigurations of the three layers of local installations (Lahlou, 2017, p. 82-144) to create situations that engendered appealing and unusual narratives (Brinberg & Hamby, 2012; Debord, 1961; Hamby et al., 2016; Shklovsky, 1965, p. 3). These situations both show, in a dramatic

²¹ "...if one remembers the sensations of holding a pen or of speaking in a foreign language for the first time and compares that with his feeling at performing the action for the ten thousandth time, he will agree with us" (Shklovsky, 1965, p. 3).

manner, what should be changed, and how it could be changed. For example, chaotic, disrespectful and dangerous use of zebra crossings, and how civic behaviour would make these pleasant and safe. These provocative and interesting narratives circulate and enable those who were not witnesses of the performances to represent it and be influenced, while narration by the witnesses facilitates appropriation by the witnesses themselves. Because of this, analysing the contents and structure of these narratives is essential to better understand the intervention's workings and impact, as well as how these narratives might be leveraged to boost the effects of other behavioural interventions in the city.

Narratives and behavioural policy interventions

Humans interpret the world and communicate with others mainly using narratives or stories (Bruner, 1986, p. 11; László, Behmann, Péley, & Pólya, 2002, p. 9): “we organize our experience and our memory of human happenings mainly in the form of narrative –stories, excuses, myths, reasons for doing and not doing, and so on” (Bruner, 1991, p. 4). They are essential to understand human activities and relations, and they dominate an important part of our daily attention and our lived experience (Hamby, Brinberg, & Jaccard, 2016). The importance of narratives for human sense-making extends to the processes of design, implementation, reception and evaluation of public policies (McBeth & Jones, 2010). Rather than through complicated technical documents, policy actors and stakeholders (including policy makers, beneficiaries, opponents and the media) often learn, make sense and try to influence others by creating and sharing narratives around policy problems and solutions (McBeth & Jones, 2010).

In the specific case of behavioural interventions, the importance of narratives on shaping policy outcomes is even more valuable. The narrative accounts that citizens and other policy actors create and share about them can effectively boost or hinder their reach and their potential to transform behaviour. Understanding these narratives and some of their basic characteristics can, in this sense, not only greatly inform our view of how people make sense of these policies, but it can also help us to design more effective and efficient interventions. For example, it is well known that attempts to persuade people to change their attitudes or behaviours can create reactance (Brehm, 1966; Burgoon et al., 2002; Mann, 2010), a resistance to such restrictions of freedom. When this involves changes in social norm systems, which can be highly “self-protective”, “those who challenge the norm might face social punishment, their failed attempts to challenge the equilibrium might result in greater harm for them than compliance. Others witnessing this backlash might be discouraged to join future movements for change” (Cislaghi & Heise, 2018b, p. 7).

But can narratives frame the reception of the message so there is less reactance? A key issue here is probably how much citizens believe they themselves make the choice of changing behaviour, rather than being forced to do so, and how much the proposed changes are somehow compatible with the local social and cultural context. This could greatly contribute to the elusive purpose of aiming to “design people-led interventions that help participants develop both internal motivations to change local norms and strategies to do so in ways that are compatible with the local cultural and social context” (Cislaghi & Heise, 2018b, p. 7).

For example, watching a sign that reads “please use the crosswalks” or even “90% of the people use crosswalks” is not the same as being mocked by a group of mime-artists for crossing the street at the wrong place, or hearing that the Mayor of a 7-million people capital decided to regulate traffic using mime-artists instead of policemen (Falconi, 2017). The mime-artist intervention is much more likely to create shock with a salient event, and stories that are told over and over, among other things because particularity and breaches of norms are important characteristics of narratives (Bruner, 1991). Depending on narrative characteristics, which we will analyse in this paper, this can significantly increase the reach and the effectiveness of such interventions. On the one hand, in large-scale contexts where it’s difficult to have each member of the target population experience an intervention face-to-face, it can increase the number of people exposed to it much further than any paid communication strategy ever could. On the other, narratives have been shown to be more effective to transform the beliefs and behaviour of people than argument-based messages (Hamby, Brinberg, & Jaccard, 2016)²².

Following these ideas, studying the narratives that different actors hold around a policy intervention could provide important insights to better understand and to potentiate their effects. Recognizing this, a systematic method to analyse some of the main components of the narratives around policy processes and outcomes has been proposed by McBeth, Jones and colleagues (see McBeth & Jones, 2010; Shanahan, Jones, & McBeth, 2018; Shanahan, McBeth, & Hathaway, 2011). The “Narrative Policy Framework” (NPF), as it is called, argues that the structure and content of policy narratives can be analysed through four main elements that constitute the minimal qualities that have been used to define narratives in policy settings: their (i) setting or context, (ii) plot, (iii) characters and (iv) moral. And while acknowledging that these narratives and other policy aspects

²² The “Conceptual Framework of Narrative Persuasion” –CFNP of Hamby, Brinberg and Jaccard (2016), provides an integration of different mechanisms of narrative persuasion identified from previous empirical research, meta-analyses and theoretical work. The framework is based on a causal relationship between a *deictic shift* (a shift of one’s self-awareness and regular point of view to that of the story, see Galbraith, 1995) and the narrative reflection – deictic return process (through which meaning is created) that create persuasion outcomes.

are socially constructed and tied to beliefs systems and ideologies, the framework allows for a certain degree of testing, generalizability and comparison between different policy contexts that is difficult in less structured approaches.

DATA AND METHODOLOGY

Materials and data collection

Narrative data can be collected and analysed through a wide variety of qualitative and quantitative methods, from surveys and interviews to participant observation and textual analysis (see Andrews, Squire, & Tamboukou, 2011; Bauer, 1996; Harbison, 2011; László et al., 2002; Shanahan et al., 2011; Shkedi, 2004; Smith, 2015, pp. 111-123). When studying a large-scale behavioural policy intervention, special attention should be paid to the narratives of the different actors and stakeholders that are relevant in the policy design and implementation processes. These could typically include the participants of the intervention, the broader public that might have heard about it, the people involved in the design and implementation of the interventions, or the communication channels that broadcasted it.

As mentioned before, this paper presents an analysis of the narratives we collected from two main strategic populations: the citizens of Bogotá and the written press (plus a few materials from designers of the original interventions). In order to maintain focus and comparability, we restricted data collection to what is arguably the most emblematic of Mockus' initiatives so far: the mime-artist intervention implemented in 1995, during his first period as Mayor. The materials, data collection methods and sampling for each type of actor included are:

- A. Citizens of Bogotá:** a total of 192 questionnaires were applied among current residents of Bogotá to collect narratives around the mime-artist intervention (see form in Annex 8). The questionnaires opened with an image of the mime-artist intervention (see image 1 before) and included open questions to collect short narratives around it, its perceived objectives and results, as well as a few closed questions about some of their characteristics. A pre-test was performed before application and adjustments were made accordingly. Respondents were approached through a snow-ball sampling strategy using local university students and members of local social organizations.
- B. Written press:** a total of 80 press articles were systematically collected from the main national newspaper in Colombia in terms of coverage and influence²³. Articles published in

²³ El Tiempo (www.eltiempo.com.co).

print or online from 1995 to 2018 that describe the intervention were included by using the newspaper's search engine and keywords "Mime*" OR "Mime*+Mockus". A total of 4,191 initial hits were screened for inclusion in the final sample. The other major written press outlets in the country were also considered for the study, but none of them (i) existed at the time the intervention started and/or (ii) had a digital library of articles that could be searched through keywords.

Additionally, a limited number of narratives from the designers of original interventions were collected to gain a deeper insight into their workings, as well as to contrast and complement the narratives of citizens and the press. Two detailed narratives were performed by us and two were collected from a previous well-known publication on the topic (the Harvard University Press volume mentioned before - Tognato, 2017). Participants included three former directors of the areas in charge of the intervention (one of which served as Mayor-in-charge), and a high-level advisor of the team responsible for its design and implementation.

Data analysis

The collected narratives were analysed through two main methods to get insights into their content and structure. This was done by exploring both the main themes they describe, and also their main structural components:

- Automated textual analysis: the narratives of citizens and the press were transcribed in their entirety and processed through a computer-assisted content analysis to extract the main thematic classes they describe (i.e. the political and institutional context, or the role of art in the interventions). For this, we used the techniques described in Schonhardt-Bailey, Yager & Lahlou (2012) to apply an automated textual analysis using Iramuteq (Ratinaud, 2009a, 2009b) software (which is similar to the Alceste software - Reinert, 1986, 1987), which was the most adapted to our corpus as we were looking to extract the key concepts from full text unstructured descriptions, in a robust and objective manner that leaves minimum latitude of interpretation to the analyst (Brugidou et al., 2000), hence facilitating reproducibility and future comparison studies. This technique "considers the text as a large matrix of co-occurrences between lexical forms and processes it with multivariate techniques" (Schonhardt-Bailey et al., 2012, p. 490), making possible to

analyse the “lexical world” of the collected narratives²⁴. This is done by the software (which is blind to the meaning of words) through statistical calculations of the associations between both words and sets of words in order to build concept clouds or thematic classes²⁵ “(i.e., concepts in which a given set of words co-occur)” (Schonhardt-Bailey et al., 2012, p. 490). Using their relevant expert knowledge on the topic and its context, experts then conceptualize and interpret the content of the classes (Lahlou, 1997, 2011b, 1995).

- Manual coding: this analysis was complemented with a manual coding of the narratives using an adaptation of Shanahan et. al.’s (2018) Narrative Policy Framework codebook (see Annex 12). The codebook allowed the collection of narrative data about three central elements of narratives: the plot that describes a temporal elements and provides causal mechanisms, the characters that tackle, cause or suffer from policy problems, and the moral which offers solutions or next steps to solve the problem (McBeth & Jones, 2010). Three researchers coded the materials after conducting a random pre-test that established an agreement between coders of 74% for plots, 81% for characters and 70% for morals. Apart from the quantitative data about the frequency in which different types of plots, characters and elements appear in the narratives, we also interpreted qualitatively the content of these categories. Finally, the narratives of designers, because of their limited quantity, were used to complement and contrast the results found among citizens and the press.

²⁴ The technique “operates in four steps: it parses the vocabulary (step A); it transforms the corpus into a sequence of Elementary Context Units (ECUs) containing words (or more exactly stemmed words or “lexemes”) and operates a descending classification which produce stable classes of these ECUs, leaving what does not fit in these classes “unclassified” (step B); it operates a series of statistical characterizations of the classes (typical words, typical sentences, crossing variables, providing X^2 values, etc.) (step C), which enable the analyst to operate interpretation (step D)” (Schonhardt-Bailey et al., 2012, p. 490).

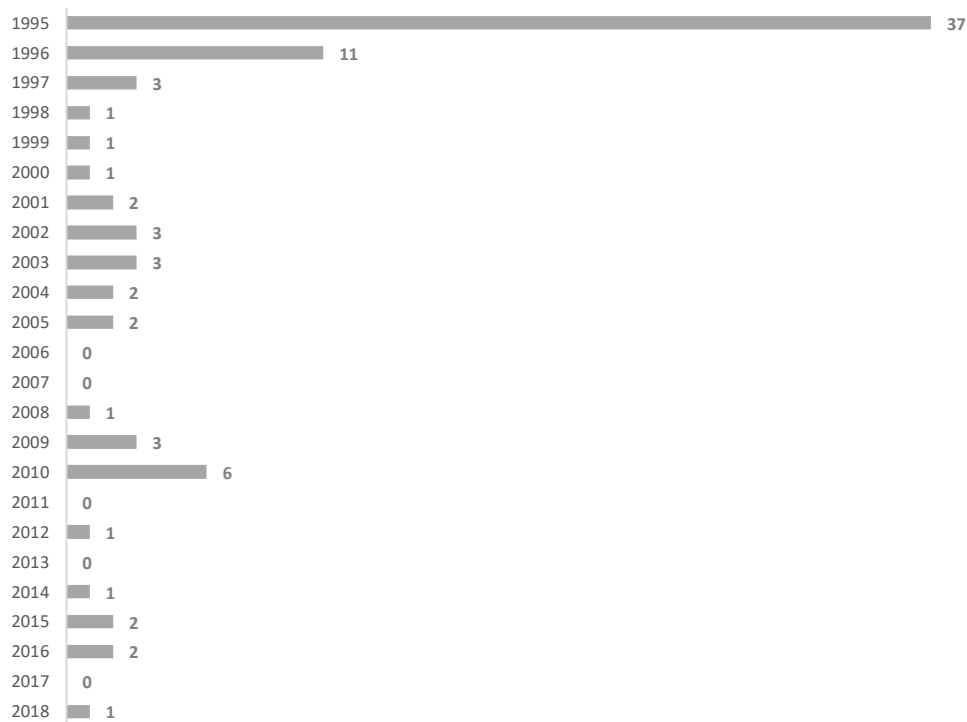
²⁵ The Alceste/Iramuteq technique considers typical words not only in terms of their association to single topics (as univariate topic analysis would do, see Schonhardt-Bailey et al. (2012), but also in terms of the context in which they occur (other words) and the relationship between the different thematic classes identified (a multivariate thematic analysis). This makes possible to analyse both the meaning of themes and the context in which they occur. The use of a crossed descending classification algorithm (as opposed to ascending clustering) ensures great stability of results and is especially well adapted to “scarce” matrixes such as the ones coming from text in natural language. See (Lahlou, 2011b; Ratinaud & Marchand, 2012; Reinert, 1987; Schonhardt-Bailey et al., 2012) for more details.

RESULTS AND DISCUSSION

In total, 117 valid answers to open-ended questions from citizens (totalling 8,680 words), 80 press articles (47,786 words), and 4 detailed interviews with designers (15,761 words) were collected for the study:

- **Citizens** averaged 35 years of age and 27 years living in the city of Bogotá. 51.8% were women, and 35% identified with being part of lower socio-economic levels (levels 1-2 in Colombia), 57% middle (level 3-4) and 2% high (level 5-6). Even 24 years after the first mime-artist intervention was applied in Bogotá, 58% of the surveyed citizens recognized the picture of it without seeing any other information and were able to answer the open-ended questions. Around half of them remember seeing the intervention on TV or seeing it directly on the street, while two-thirds recall talking to their family and friends about them at some point.
- **Press articles** were published mostly on the same year in which the interventions started (1995 - 42.5%) or the year after (1996 – 13%). Nevertheless, there are examples of articles with short descriptions of mime-artist interventions for most years between that time and the present (and although 1-3 articles per year is not much, it does show a continuous presence in the country's major press outlet that few behavioural policy interventions achieve). The following graph presents the frequency of collected press articles per year:

Graph 1. Number of selected press articles per year



As can be expected, during this time the intervention has been mentioned with different objectives in articles that address very different topics. Broadly, there were 5 main types of articles that describe the mime-artist intervention in some way: those that fully describe the original intervention, those that analyse the social and political context and the effects of the original intervention, those that describe the city's problems and potential solutions, those that report on similar mime-artist or civic culture interventions, and the articles about local and national elections in which Mockus and/or the interventions were deemed relevant.

In the next section, we present the results of our analysis of the structure and content of the collected narratives.

Results: the structure and content of narratives

Although concerned with describing the same behavioural policy, the narratives collected from the written press and from citizens are quite different in terms of their structure and content. Those differences (as well as some similarities that they both share), speak about how each of the policy actors perceive, make sense and describe the intervention.

Because of how they were collected and their characteristics, citizen narratives are shorter, were all collected recently, and focus almost exclusively on the mime-artist intervention and its perceived effects. Press articles, on the contrary, tend to be longer, were written over the last 25 years, and focus on a wider range of topics. Indeed, in most of them the mime-artist intervention is mentioned only in a few sentences or paragraphs (apart from a few early exceptions that are entirely dedicated to describing it).

Main themes and lexical worlds

Studying how specific vocabularies tend to occur together in narratives allows us to explore the main themes, concept clouds or lexical worlds that organize them. Rather than a simple grouping of words, this task comes from the assumption that “the speaker, during his speech, is investing successive different worlds and these worlds, by imposing their properties, thereby impose a specific vocabulary. Therefore, the statistical study of the distribution of this vocabulary should be able to trace these ‘mental rooms’ that the speaker has successively inhabited” (Reinert, 1987 translated in Schonhardt-Bailey et al., 2012, p. 509).

Narratives around the mime-artist intervention in press articles were organized by the Iramuteq software in four classes that we have interpreted using the following themes:

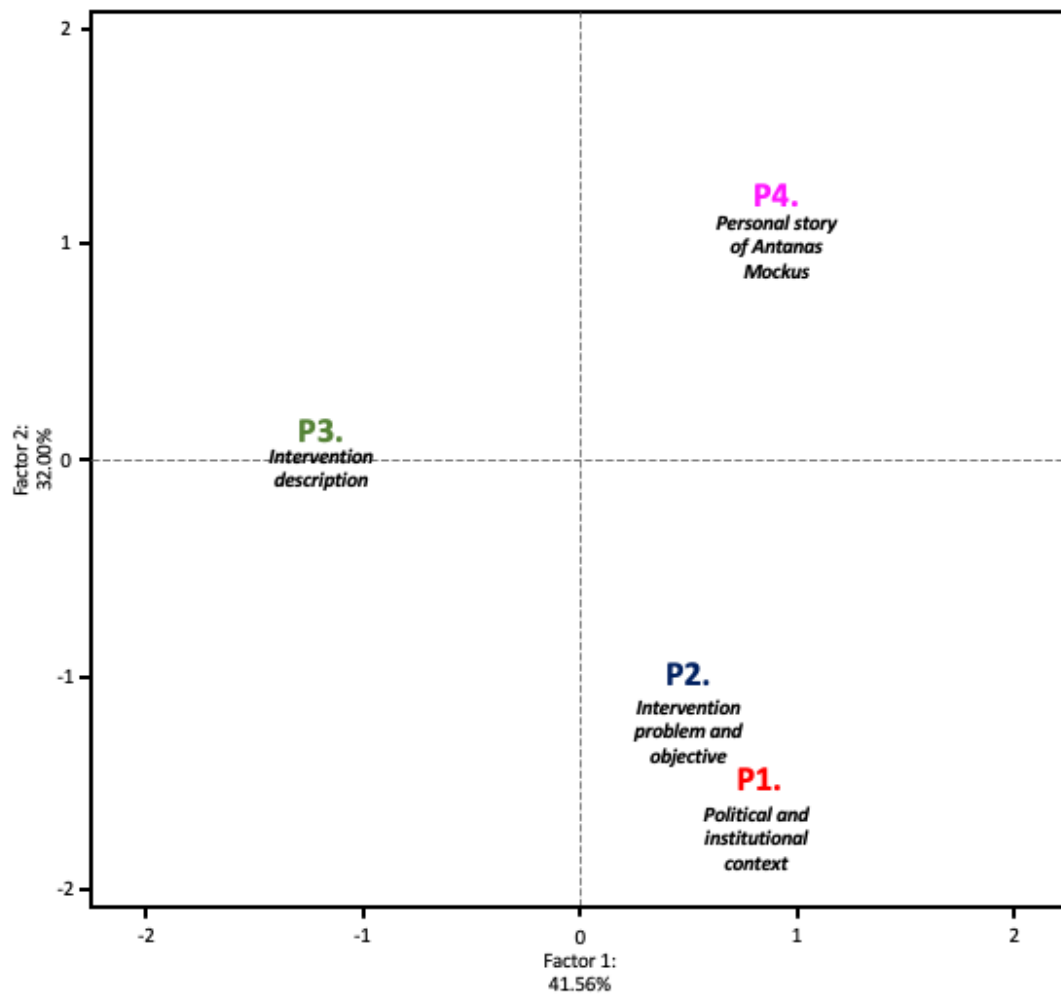
- P1. *Political and institutional context* (size: 12.4%), which includes passages about the initiatives that different political actors and institutions (e.g. the local council, the government, public companies, political parties) undertake (which can be in relation to the mime-artist intervention but also to more general urban policy issues). A characteristic phrase of this class (with characteristic words in bold) is for example: “...even if the **council** didn’t **approve** the **draft agreement** that proposed the creation of the **company** of the **system** of time and public space”.
- P2. *Intervention problem and objective* (23.4%), which includes passages that explain the general concepts and goals of the mime-artist interventions and other civic culture initiatives (discussing issues like civic culture, education, equality, rights and public space). A characteristic phrase example is: “...his **government plan** had six **sections civic culture environment public space** accelerating **social** progress **improve urban** competitiveness and **recover institutional** legitimacy the priority was **civic culture**”.
- P3. *Intervention description* (34.5%), which includes passages that describe the mime-artist intervention in concrete terms, including their setting (e.g. streets, crosswalks, traffic signs)

and characters (e.g. pedestrians, mime-artists, drivers that “teach”, “play” and “learn”). For example, “one of the programmes with the most impact was the **mime-artists** which in March 1995 **went out** to the **street** 19 to **teach pedestrians** and **drivers** to **cross** using **zebra-crossings** and keep **road intersections clear**”.

- P4. *Personal story of Antanas Mockus* (29.7%), which includes passages that describe personal stories about Antanas Mockus both before and after the interventions (his association with the green party, his political campaign for the presidency in 2010, his role as university teacher before being Mayor). For example, “...**talk** about the **Colombian presidential candidate** **underlining** the fact that **Mockus** is a philosopher and mathematician who comes from the **academic world** and not from **traditional politics**”.

While space limitations prevent us from presenting all typical characteristic words and phrases of each class here, these are included in Annex 10. The Multiple Correspondence Analysis that the software applies to these classes, and which produces a graphic representations of which of them tend to appear together in the sample, shows how articles *political and institutional context* (P1) and *intervention problem and objective* (P2) tend to occur together, while the other classes tend to be further apart. Graph 1 presents the results of the MCA for the thematic classes in press narratives.

Graph 1. MCA analysis for press narratives



In this case, the horizontal axis in the resulting graph seems to oppose narratives about the *intervention setting* to those that include the other three classes, while the vertical axis seem to oppose narratives that include the *personal story of Antanas Mockus* (P4) to the *political and institutional context* (P1) and *intervention problem and objective* (P2) classes. These oppositions might be linked with the chronological evolution that can be seen in press articles on the topic. From articles concerned with describing the concrete intervention setting and actions (describing streets and the mime artists, drivers and pedestrians on them) that reported on the first interventions and shortly after them (quadrants I and III), follow articles that provide commentaries and interpretations of the intervention problem and the political and institutional context behind it (quadrant IV). These two categories don't seem to mix often. Finally, articles that describe the personal story of Antanas Mockus both before and after the interventions also don't seem to mix often with the other two types, although they are somehow closer to those in quadrant 4 than to the ones that describe the intervention setting.

The narrative of citizens, on the other hand, despite being shorter, show a richer variety of themes. Citizen narratives dwell on the role of Mockus as hero (initiator) of the interventions and the role of art in the intervention, as well as four different takes on its perceived objectives and results (law and policy, education, behaviour and awareness). A total of 6 classes with similar sizes were identified by the software:

- C1. *Antanas Mockus and civic culture* (16.9%), which includes passages that link the character of Mockus (mentioned by name) to his actions to implement the civic culture approach and the mime-artist intervention (e.g. to try, to teach, to promote, mime-artists). A characteristic phrase of this class is: “the image is **part** of a **strategy** implemented during the period of **Antanas Mockus** as **mayor** to promote **civic culture** a **pedagogical strategy** that **sought** that **citizens** learned how to behave in certain **situations** to guarantee the wellbeing of the city and the **citizens**”.
- C2. *Intervention objectives (emphasis on law and policy)* (15.9%), which includes passages about the perceived objectives and impact of the intervention in terms related to policy and law initiatives (e.g. “decrease the indexes”, results, awareness, norm compliance, traffic). For instance, “...the mayor **did** this intervention to **decrease** the **index** of accidents in our country it didn’t had very **good results** because **people** are not very tolerant and don’t like to **comply** with **norms**”.
- C3. *Intervention objectives (emphasis on education)* (13.9%), which includes passages about the perceived objectives and impact of the intervention in terms related to education and pedagogy (e.g. “educate both pedestrians and drivers”, the people “began to understand”). For example, “the **objective** was to **educate both pedestrians and drivers** to **avoid accidents** and **respect** the **road** it had a **positive** impact to achieve the planned **objective**”.
- C4. *Intervention objectives (emphasis on behaviours)* (16.4%), which includes passages about the perceived objectives and impact of the intervention in terms related to the concrete behaviours and actions to be changed (i.e. “show people how to cross the street”, “respect traffic signals” and avoid accidents). For example, “to show people how to **cross** the **street** the **respect** for their life so that people **respect traffic signals** and don’t risk their lives when **trying** to **cross** the **streets**”.
- C5. *Intervention objectives (emphasis on awareness)* (18.9%), which includes passages about how the intervention wanted to achieve changes in the awareness of citizens around

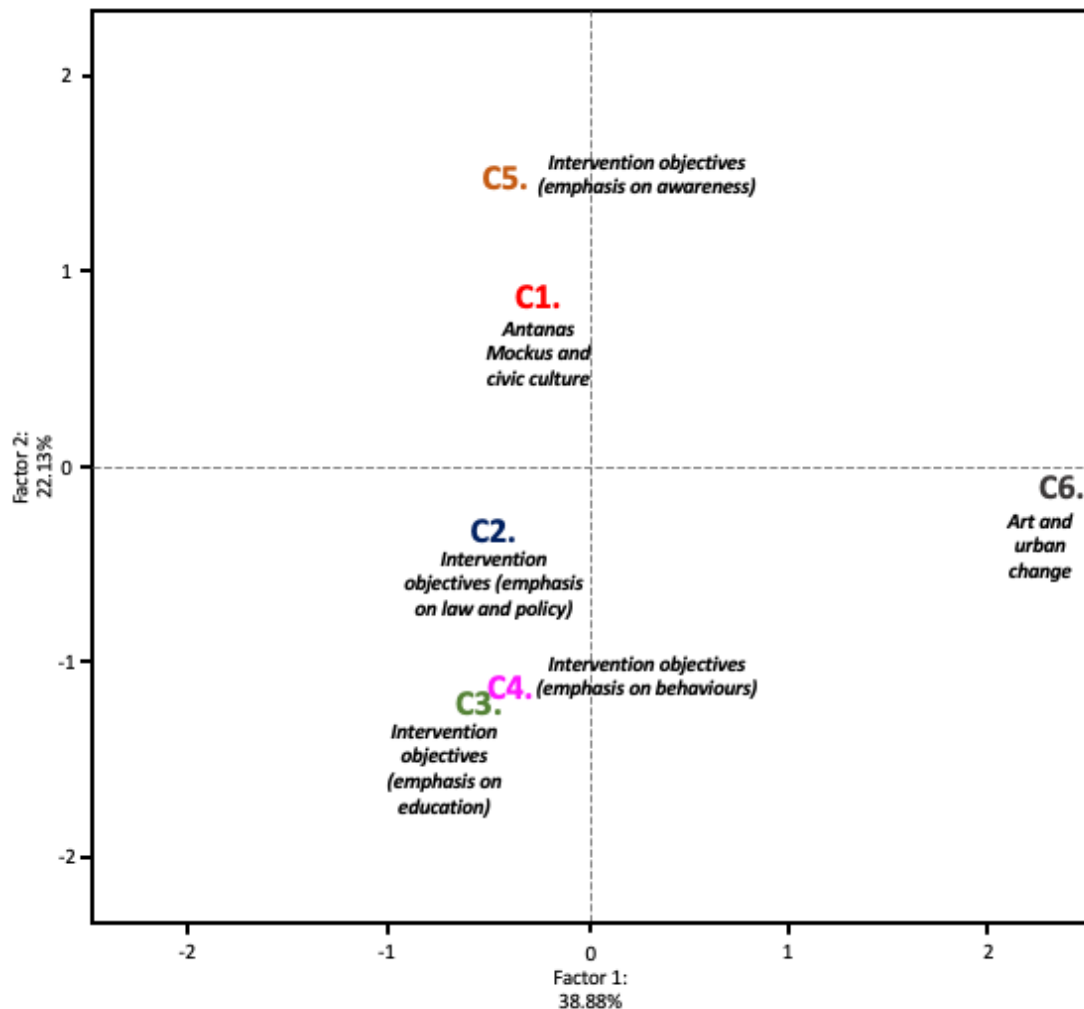
the target problem (i.e. “change the awareness in many people”, “to create citizen awareness”, “create awareness and change in the culture”). For example, “looking to create citizen **awareness** about the **correct use** of crosswalks it did **achieve** a result in the people that have a real **sense** of belonging **achieving** an internalization”.

- C6. *Art and urban change* (17.9%), which includes passages that describe the artistic dimensions of the mime-artist intervention and its potential for urban change (e.g. artists, talent, abilities, cultural activities, public space, city, park, participation). For example, “...I would **tell** them about an **artist** in a **public space showing** their **talent** and **abilities** and **culture** to a **group of people**”.

A table with the top characteristic words and phrases of these classes is also presented in Annex 10. Citizens, as can be seen here, are much more concerned with the intervention, its main characters, methods and perceived objectives, than with the political and institutional context behind them or the personal history of their creator. The intervention objectives, which includes assessments of their impact, seems to be particularly interesting for citizens, as four classes that focus on different lexical worlds have emerged.

As for the Multiple Correspondence Analysis of citizen narratives, *Antanas Mockus and citizenship culture* (C1) tends to occur together with *intervention objectives (emphasis on awareness and change)* (C5), while *intervention objectives* that emphasise *education* (C3) tend to appear with those that emphasise *behaviours* (C4). These two groups (C1-C5 and C3-C4) show interesting differentiations between narratives that focus on how the intervention transformed behaviours by educating “both pedestrians and drivers”, and another that links together the specific person that created the interventions with their goal to change the civic culture and the awareness of the city’s inhabitants. And while the former uses more concrete words and descriptions such as “to **educate both pedestrians and drivers to avoid accidents and respect the road**”, the later uses comparatively more abstract sentences such as “to promote **civic culture a pedagogical strategy** that **sought** that **citizens** learned how to behave in certain **situations** to guarantee the wellbeing of the city and the **citizens**”. Graph 2 presents an overview of the MCA for these narratives.

Graph 2. MCA analysis for citizen narratives



In this case, while the horizontal axis seems to oppose narratives that speak about the role of art in the interventions (C6) to all other classes, the vertical opposes the two aforementioned groups (C1 with C5 and C3 with C4). Class two, which is related to an emphasis on law and policy while describing the intervention objectives, seems to be linked to both of those groups. This suggests that while some narratives are more concerned with Mockus and his effort to transform civic culture and awareness, and others with behavioural change through education, both groups tend to include descriptions of law and policy objectives.

Characters

The main characters of policy narratives, as defined by the NPF (McBeth & Jones, 2010), are the actors that either try to fix the policy problem by introducing a policy initiative or intervention (the

heroes), that are seen as causing the problem (villains) or that are harmed by the problem (victims). In our sample:

- **Heroes:** 95% of press articles and 70% of citizen narratives identified some type of hero, which are important because they are the agents that are perceived as in charge of the intervention. The vast majority of press articles identified mime-artists as heroes (92% - e.g. reporting that mime-artists took over the streets “to make everyone more aware of their behaviour” [El Tiempo, 1995b] and to “educate drivers and pedestrians” [El Tiempo, 1995d]), while around half of them identify Mockus (54% - e.g. discussing an “innovative campaign on the part of Mockus to create citizen awareness among the population” [citizen P17]) or the Mayor’s Office (48% - e.g. describing “an initiative of Bogota’s Mayor’s Office in the mid-90s that aimed for more tolerance in crosswalks” [citizen P21]). For citizens, the largest proportion was the Mayor’s Office (54%), followed closely by the mime-artists (49%). Fewer citizen narratives identified Mockus as hero (30%), while across both groups very few identified citizens as heroes (7-10%). According to these results, press articles seem to give a greater importance to the most visible aspects of the intervention (the mime-artists) compared to citizens, while citizens are much less concerned than the media with Mockus as individual. Both, on the other hand, seem to place a similar importance (50%) on the Mayor’s Office and its institutions as originators of the interventions.
- **Villains:** a much lower proportion of press articles and citizens identified villains that cause the policy problem in their narrative: 73% and 47% respectively. In both groups, nevertheless, most villains were linked to citizens (both pedestrians and drivers) that don’t follow traffic norms (97% in the press and 100% in citizens). In those narratives, interventions face the daunting task of transforming people that have “old vandalism customs” (Amarillo, 1996), that “completely ignore how to use those lines on the floor” (citizen P131), and that that cause “traffic accidents” because they “lack civic culture and don’t comply with traffic norms” (citizen P55). Very few narratives in the press (and none in citizens) identified mime-artists as the villains (3%), comparing them to ineffective circus acts that waste public resources (El Tiempo, 1996).
- **Victims:** a much lower portion of the narratives in our sample identified victims, which are those that suffer some harm because of the policy problem. Only 49% of press articles did so, and only 23% of citizen narratives. All of those narratives from citizens (100%) and the vast majority of the ones from the press (95%) identified victims as the citizens themselves.

In the narratives, interventions attempted to “promote pedestrian safety” (citizen P98) and avoid “several accidents and deaths of pedestrians, and improve traffic” (citizen P29).

- **Beneficiaries, allies and opponents:** in addition to heroes, villains and victims, NPF studies sometimes identify other types of actors as well (O’Donovan, 2018; Shanahan et al., 2018). These include beneficiaries (those that benefit from the intervention), allies (those that help the hero) and opponents (those that oppose the hero without being the villain). In the narratives of our sample, these characters were much less common. Predictably, beneficiaries were often associated with citizens (both pedestrians and drivers), while no allies or opponents were mentioned in citizen narratives. Press articles did often mention allies, including other authorities and institutions, the police, private companies and social collectives, as well as opponents, mainly the local council and some public servants. Together, these characters paint a more complete picture of some of the policy actors that are presented as relevant in press narratives around the intervention.

In summary, the following table (1) presents the main types of characters found in our sample for each of the two populations.

Table 1. Types of characters for citizens and the press

Characters	Citizens	Press articles
	<i>(70% identify a hero)</i>	<i>(95% identify a hero)</i>
Heroes	54% - The Mayor’s Office 49% - Mime-artists 30% - Antanas Mockus	92% - Mime-artists 54% - Antanas Mockus 48% - The Mayor’s Office
	<i>(47% identify a villain)</i>	<i>(73% identify a villain)</i>
Villains	100% - Citizens (that don’t follow traffic norms)	97% - Citizens (that don’t follow traffic norms) 3% - Mime-artists
	<i>(23% identify a victim)</i>	<i>(49% identify a victim)</i>
Victims	100% - Citizens	95% - Citizens 7% - Mime-artists
Others	• Beneficiaries: citizens (pedestrians and drivers)	• Beneficiaries: citizens (pedestrians and drivers) • Allies: other authorities and institutions, the police, private companies, social collectives • Opponents: local council, some public servants

Plot

The NPF defines plots as “fundamental components of narrative, providing relationships between component parts and structuring causal explanations that determine the plausibility of narrative” (McBeth & Jones, 2010, p. 340). In our sample, 75% of citizen narratives and 59% of press articles include some kind of plot (with the rest just describing or mentioning the intervention without establishing chronological relations or consequences). Overall, narratives by citizens present a more optimist account of the effects of the intervention in the city. While around half of citizen narratives describe how the intervention changed a bad situation for the better (an *optimist* narrative), the largest proportion of press articles (which account for 20% of them) describe a “*stymied progress*” (Shanahan et al., 2018, p. 343) in which things were bad, then a hero made them better, but then they became bad again. Both of these types of narratives are also included in the other population, with *stymied progress* appearing in 22% of the citizen narratives and the *optimist* narratives in 16% of the press articles.

Optimist narratives among citizens often describe the positive impact the intervention had on people’s awareness and behaviour when using crosswalks, which had an impact in accident rates and fatalities: “It was an optimal result because people started to understand what this measure was about (both pedestrians and drivers) and in this way many accidents and deaths were prevented” (citizen P29). Sometimes, this optimist perspective goes beyond traffic behaviour, with perceptions of effects on “quality of life, love for the city [...], to have better coexistence, to respect others” (citizen P101). As for *stymied progress* narratives among the press, most articles present a story in which Bogota was “completely chaotic” (El Tiempo, 2010a), then the mime-artist intervention “took over the streets to make sure that crosswalks were respected, to assure compliance with traffic norms” (El Tiempo, 2005), but after the interventions and his periods as Mayor ended, the city “went into sharp decline” (Valencia Tovar, 2009) and any progress “threatens to disappear” (El Tiempo, 2005).

Additionally, the “*story of helplessness and control*” (Shanahan et al., 2018, p. 343) plot, in which a bad situation that is perceived as unchangeable is described together with how change can occur, also appear in both categories in smaller proportions (13-14% for both citizens and the press). In these narratives, citizens and press articles describe how problems were very hard to change, but emerging interventions give hope that transformations are occurring: “yesterday’s was a symbolic marriage between a beautiful and happy girl named Bogota and his citizens willing to pamper and care for her, even with traffic jams” (El Tiempo, 2010b). Finally, very few narratives in both populations describe plots in which people thought there were improvements, but this was an illusion (“*change is only an illusion*”), or everything was and continues to be bad despite of the

interventions. Finally, other popular plots in the NPF (see Shanahan et al., 2018, p. 343) like “conspiracy” or “blame the victim” are not present in our sample.

Related to the plot, narratives often define causal mechanisms between policy problems and the actions of the story’s characters (Shanahan et al., 2018). In our case, 69% of press articles include some type of causal mechanism, but only 40% of the citizen narratives do so. For both groups, the majority of these are associated with unguided actions that create consequences (a *mechanical cause* in NPF – present in 87% of citizens’ narratives that identify these mechanisms and 83% of those in the press): specifically, citizens –drivers and pedestrians– don’t follow traffic norms and act in detrimental ways because they don’t know better, and end up creating negative consequences for themselves and others –chaos and accidents.

Moral of the story

Finally, another key element of the narratives around policy initiatives is the moral of the story. In the NPF, this is defined narrowly as the policy solutions that are offered to the problem presented in the narratives. Because of how our sample was collected (that is, focusing on one specific policy solution rather than a broader policy problem), all our narratives include the mime-artist intervention as a moral in the NPF sense. Nevertheless, exploring the other policy solutions that are described as complement can shed light on the perceptions that these groups have about both the intervention and the problem, and consequently, also about the solutions they think are related.

In respect to this, citizens seemed more concerned with the introduction of laws and regulations (49% - e.g. by referring to traffic laws and norm compliance), while fewer mentioned other civic culture interventions by Mockus (28%). This order is reversed in press articles, which discussed other civic culture interventions more often (47%) than laws and other regulations (39%). Finally, press articles seem more interested than citizens in control by the police and fines (23% versus 1% - e.g. calling for more police control) and in physical changes in the city (21% versus 4% - e.g. building of public spaces and transport systems).

But in addition to this, the narratives we collected also convey much broader morals expressed in the main topics, characters and plots that structure them. On one hand, this is linked with the passages that narrate the goals of the intervention (P2 for the press and C2, C3, C4 and C5 for citizens), which as we have seen describe their informational (awareness), regulatory (law), behavioural and pedagogical goals. But in the other hand, there is another set of morals that we will explore in the discussion below, and which are linked to *how* the intervention was applied: for

example, the sense that change is possible, that groups can act to achieve that change (group efficacy), that we can become vigilantes of others to try to make the city better, or that art and mockery can transform the city.

To summarize our results, the following table (2) presents the main trends we have obtained for the narratives of citizens and press articles around the mime-artist intervention.

Table 2. Main thematic and structure trends for citizens and the press

Characteristics	Citizens	Press articles
Sample	116 valid answers Av. age 35, av. years living in Bogota 27, 51.8% women	80 press articles Published from 1995 to 2018, 55.5% on the same year of the intervention or the year after (1995-1996)
Thematic classes	18.9% - C5. Intervention objectives (emphasis on awareness and change) 17.9% - C6. Art and the city 16.9% - C1. Antanas Mockus and civic culture 16.4% - C4. Intervention objectives (emphasis on behaviour) 15.9% - C2. Intervention objectives (emphasis on law and policy) 13.9% - C3. Intervention objective (emphasis on education) C1 and C5 tend to appear together, also C3 and C4. All opposed to C6.	34.5% - P3. Intervention description 29.7% - P4. Personal story of Antanas Mockus 23.4% - P2. Intervention problem and objective 12.4% - P1. Political and institutional context P1 and P2 tend to appear together and are opposed to P4
Characters	<ul style="list-style-type: none"> • Heroes: 54% - The Mayor's Office, 49% - Mime-artists and 30% - Antanas Mockus • Villains: 100% citizens • Victims: 100% citizens • Others: citizens 	<ul style="list-style-type: none"> • Heroes: 92% - Mime-artists, 54% - Antanas Mockus and 48% - The Mayor's Office • Villains: 97% citizens • Victims: 95% citizens • Others: citizens, other authorities and institutions, the police, private companies, social collectives, local council, some public servants
Plot	48% - Optimist 22% - Stymied progress 14% - Story of helplessness and control	20% - Stymied progress 16% - Optimist 13% - Story of helplessness and control
Moral	49% - Law and regulations 28% - Other civic culture interventions 4% - Physical changes in the city	47% - Other civic culture interventions 39% - Laws and regulations 23% - Police control and fines 21% - Physical changes in the city

Discussion: the power of narratives in behavioural policy interventions in the city

The narratives that different policy actors create and share around a policy interventions, problems, and solutions, can shape most aspects of their design, implementation, and impact. This is especially true with urban policies that attempt to influence the behaviour of citizens, as narratives will often shape how interventions are perceived and interpreted, and consequently

whether they can influence or persuade citizens or not (which is their ultimate objective). Narratives have been shown to be effective to change the beliefs and behaviours of people in both policy (Crow & Jones, 2018; Veselková, 2017) and non-policy (Hamby, Brinberg, & Daniloski, 2016; Hamby, Brinberg, & Jaccard, 2016) realms, even more than technical documents or rational arguments. In the particular case of the mime-artist interventions that were applied to influence traffic norm compliance in a few street intersections of Bogota almost 25 years ago, different or weaker narratives could have easily meant that the intervention could only have reached the few dozen (hundreds at best) of people that saw it on the street. It could have been forgotten, and with it its impact would likely have been lost. Community dialogues, as has been shown on research about real-world social norm interventions for health promotion, have the potential to create an organized diffusion when people “can be effectively empowered to share their new knowledge and understandings systematically with other in their networks, eventually facilitating social norm change” (Cislaghi et al., 2019, p. 936).

In our case, the level of detail of the narratives in our sample about an event that happened 25 years ago, together with the fact that two-thirds of citizens recognized the image of the intervention without giving them any other information, and that the most popular newspaper in the country still periodically describes it in its articles, all seem to indicate that the intervention was successful in creating pervasive narratives that are still relevant today. By collecting empirical data and exploring how these narratives are shaped, the main themes they develop and the plots and characters they use, as well as the differences in these issues among distinct policy actors, we are much better placed to understand their particularities and effects than by looking exclusively at the actions they undertook and the quantitative changes they produced. And although the decision to limit our study to this particular and unusual case restricts the generalizability of our findings, we believe that a better understanding of the particularities of this intervention will prove useful for urban policy design (by describing the main issues that seemed to be important for policy actors in this successful case) and also for further research and empirical testing (by describing possible areas of enquiry and a case-study for comparison). These, of course, should be nuanced according to cultural and political particularities.

Our study shows an initiative that creates a “surprising” and “unexpected” intervention to tackle a common urban policy problem (the Mayor’s Office hired mime-artists to influence traffic behaviours rather than sending policemen or installing signs): “[the campaign] contributed to inhabitants respecting the city norms [...] he [Mockus] did it in a very different creative way, away from repression or traditional campaigns” (citizen C9). The power of surprising artistic performances to create reflections about everyday life is well documented in art and cultural

theory (Debord, 1961; Highmore, 2002; Shklovsky, 1965), and it is often described in the literature about Mockus' interventions as one of the defining characteristics of their success (Cala Buendia, 2010; Sommer, 2006). His interventions are "not paid campaigns, but novel, attractive methods, with a high visual or psychological impact" (Mockus, 2002, p. 25).

This "reflexive transgression" (Vignolo, 2017, p. 482) gets people and the media talking: according to one of the intervention designers, "there was controversy even from the media, because [...] these were risky actions, but precisely that was the idea. [...] When there's an institutional announcement in the press or on TV, I believe that vanishes most of the effect. It has to be something that the media are interested on reporting following their own initiative" (designer P1). This idea is also present in citizens and the press: as a citizen quoted in one of the first press articles about the intervention says, "...it seems incredible to me, especially in Bogota's city centre, which is so dangerous according to people. This changes the environment. It's like a form of solidarity. Look at how everyone is following them; and they're happy. I think they're going to speak all day about that" (El Tiempo, 1995b).

But of course, the narratives that are produced and shared by policy actors are much more complex than the description of those first surprising events. Our findings shed light on the characteristics of these narratives, which pertain to three main areas: (i) their main themes and anchors, (ii) their main characters and their agency, and (iii) the audience and their agency as a group. We now turn to discuss the practical and theoretical implications of each one of these areas, followed by a short reflection about how their characteristics link to the concepts of collective action and social sustainability.

The main themes of the narratives

Our data shows that narratives from citizens and the press are dominated by 5 broad thematic areas:

1. Intervention problem and objectives (in both groups, but as discussed is richer in citizens with emphasis on law and policy aspects, education, behaviour and/or awareness aspects)
2. The character of Antanas Mockus as creator of the interventions, either in his personal story (for press articles) or in his effort to change civic culture (for citizen narratives)
3. Concrete intervention descriptions (for press articles)
4. The political and institutional context around the intervention (for press articles)
5. The artistic elements of the intervention and their relation to the city (for citizens)

The way in which these thematic areas tend to appear together in the collected narratives shows a distinction that has already been identified in other NPF studies (Crow et al., 2017, p. 649) between more operational and concrete definitions of policy problems and solutions, and those that describe broader and more abstract impacts. In our data, this was expressed in the opposition between press narratives that describe the intervention (P3) with the rest, and citizen narratives that describe educational and behavioural objectives (C4 and C3), with those that describe Antanas Mockus as hero to change civic culture and awareness (C1-C5). And while both of these sides seem to be important elements to structure the understanding that these policy actors have about the intervention, judging purely by size and maybe as a result of how much time has passed since the interventions was applied, more abstract narratives seem to prevail in our data (65% vs. 35% in the press and 38.5% vs. 30% among citizens).

On another level, the fact that a significant proportion of narratives is dedicated to describing different aspects of the intervention's goals and the civic culture approach (84% in citizens and 23% in press articles) links to an important condition set by Mockus for his interventions: "Co-ordination between institutions and an understanding of the process by society, which were necessary to obtain the results achieved, depended largely on the institutional and social appropriation of the idea of civic culture itself" (Mockus, 2002, p. 24). This of course is consistent with the organizational change literature, in which "[c]hange related communication focused on building employees' understanding of the need for the change initiative is crucial" (Whelan-Berry & Somerville, 2010, p. 183). In our case, a "change of attitude in people" (citizen P10), creating "awareness and education over the medium and long terms about behaviour" (citizen P24), and people starting to "understand what it is all about" (citizen P29) are common expressions in citizens' narratives. This reflexive element, amplified by the media coverage, is an interesting and rather specific characteristic of Mockus' interventions (and not specific to the mime one). The population is addressed as an audience (and as in theatre a *collective* audience, as we will discuss below) rather than treated as just a target.

This is to be noted in conjunction with the absence of conspiracy theories and of any Machiavellian plot by the powers in place. For some reason, the motive of civic action and greater good has not been questioned by the policy actors (only the methods used and whether it is possible at all to achieve those goals). As the existence of such hidden agendas can be a reason for non-compliance or opposition, this absence is worth noting. One hypothesis here is that civility and social norms are actually the core of the narrative, as much as the target behaviour itself. And indeed, what is described in the narrative, as our analysis reveals, is not so much the target behaviour ("people crossing streets" or "drivers respecting zebra crossings") as would be in classic social norm

interventions, but rather the action of heroes (the mimes, the Mayor, the institutions) enforcing civility by reminding the rules.

Then, apart from goals, a critical way in which people seem to make sense of the mime-artist interventions has to do with the context information and the other initiatives that are discussed together with them. As presented above, policy narratives are usually built around problems that must be solved and solutions that are proposed or implemented to do so. In this case, because we studied a specific solution (the mime-artist intervention) for a specific problem (traffic-norm compliance), collecting information about the other policy initiatives that are used by policy actors to interpret the mime-artist intervention is important. This is especially true in interventions based on the aforementioned “reflexive transgression” (Vignolo, 2017, p. 482), because it allows people to provide a context and an anchor (Moscovici, 1984; Wagner et al., 1999) to understand what was done (which can otherwise seem “too strange” or “too confusing”). Through sentences like “this is like X, but Y”, or “W was done instead of Z”, people insert the mime-artist intervention into familiar representations to make sense of them.

In our results, this anchoring is expressed on two levels. The first one relates to the narratives that describe topics linked to the intervention, without directly describing it. As we saw, among citizens these narratives revolved mainly around the artistic elements of the intervention and their relation to the city, while among the press they were about the political and institutional context around the intervention. On the second level, there are the narratives about other policy initiatives that are used to better explain the mime-artist intervention (which we called morals of the story following the NPF). As we saw, both laws and regulations (especially for citizens) and other civic culture interventions (especially for the press) were used. The former explains the mime-artist intervention as an alternative strategy to increase compliance with the law; the latter as one among the other citizen-culture initiatives used by Mockus to change citizens’ behaviour. Together, these two elements link the mime-artist intervention to other well-known (and mostly more “traditional”) manifestations of city life in Bogota and in the policy problem at hand, in order to make better sense of it.

Together, the main themes, the emphasis on goals and the anchors that people use to make sense of the mime-artist intervention shows why a certain degree of understanding about the intervention’s process and the idea of civic culture on the part of society, which presumably includes both citizens and the press, is perceived as a condition for the results that were achieved. As an intervention designer explains, “It was something that attracted attention and changed the city’s landscape. It was something shocking for citizens, they always asked questions about it. [...] Our experience is that you first need the participation and support of citizens. To expose it to

citizens in order to generate questions. To generate curiosity on citizens about why and to what end these things are being done” (Designer P1).

Although our data doesn’t allow us to evaluate any association with effectiveness, this effort is apparent in the narratives of both citizens and the press, as both of them dedicate a significant amount of space (for the press) or are almost dominated (for citizens) by narratives about the objectives of the intervention (and in less part the broader civic culture approach). In a certain sense, the “surprising” and “unexpected” character of the intervention also seems to have an additional advantage: it gets people to ask questions and try to understand “why and to what end” an intervention is being applied.

The characters of narratives and their agency

In terms of characters, and consistently with previous NPF studies (Crow et al., 2017), heroes hold a more prominent space than villains and victims for both press and citizen narratives. These are mainly divided between the ones responsible for the actual application of the intervention (mime-artists, which are also the most visible and surprising aspect of the intervention), the person behind their creation (Mockus), and the institution in charge (Bogota’s Mayor’s Office). Although this order of prevalence for press articles is not surprising, unexpectedly for citizens the institutional hero (Bogota’s Mayor’s Office) is much more prevalent than the personal one (Mockus), and it is as important as the most visible and surprising characters of the intervention (the mime-artists).

Heroes, previous NPF research has shown (Crow & Jones, 2018), are the most likely characters to persuade and influence people. In our intervention, data suggests that among the three main types of heroes that are described, citizens care about the institutional actors as much as, or even more than, the most visible characters and the individual behind it (even if this individual has the status of a celebrity in the country). This suggests that although Mockus is already perceived as an unconventional character, the fact that the Mayor’s Office hired mime-artists to influence citizens is an important element of the narratives that are shared around the intervention.

As for the other types of characters, the narratives show a double status of citizens as both villains and victims, which predictably might not be an uncommon attribute in behavioural policy interventions (and many other types as well). This perception of citizens in general as villains (or the pedestrian or driver subgroups) is consistent with the existence of social norms (Tankard & Paluck, 2016) in which transgressions of traffic rules are typical (descriptive norms) and likely also acceptable (injunctive norms) among a certain group. In a similar way to other social norm interventions (Yamin et al., 2019), the mime-artist intervention exposed the target population (the

citizens of Bogota) to the behaviours and opinions of others (mostly mime-artists and the citizens that encounter them) to communicate that these transgressions were less and less typical and acceptable, to the point that people themselves were actively trying to change them on the streets. Nowadays, when asked about the perceived impact of the intervention, many citizens express a change in these perceptions: “today most pedestrians know what a crosswalk is and what its use is” (citizen P87) and “today the crosswalk is respected” (citizen P86).

But unlike previous literature hypothesising that the victim-villain duality might be a constraint to policy debate and solutions (Crow et al., 2017, p. 649), we believe that this element is the defining point of many behavioural policy interventions (and many other types as well) and could rather be linked with the potential for an increased sense of responsibility and need for collective action on the part of citizens (Thomas & Louis, 2013, 2014). Because even if citizens are not included explicitly as heroes on many narratives around this intervention, expressions like “we must change” (citizen P76), “we must use crosswalks” (citizen P96) and “we must improve our Bogota” (citizen P146) are common in their narratives and are indicative of the fact that we are not dealing with passive spectators of the mime-artist drama. Rather than a difficulty to relate to local victims in previous research (Crow et al., 2017, p. 649), our narratives show the realization that in this problem, in the end, we are all villains and victims and as such we should all be involved in the solutions: “it made citizens realize that some of their actions were negative for the city and had repercussions. We had to change them” (citizen P76). The importance of collective action to increase the effects and sustainability of change initiatives has been underlined in a wide variety of research realms, from employee participation in organizational change processes (Whelan-Berry & Somerville, 2010) to community engagement in social norm interventions to promote health in low-income countries (Cislaghi et al., 2019; Cislaghi & Heise, 2018b).

The agency of the human and institutional actors to tackle the policy problem at hand can also be seen in the plots that the narratives present. Indeed, most narratives in the sample describe the positive effects that the intervention had, either indefinitely (especially among citizens) or temporarily before a new decline (especially for press articles). This of course speaks about the perceived impact of the intervention, but it also speaks about severe policy problems that can (despite their magnitude and however partially) be effectively tackled with creative behavioural interventions. For those of us with practical experience in policy interventions that seek to influence citizen behaviours and for researchers in collective agency and action (Bandura, 2000; Thomas & Louis, 2014) alike, this is one of the most critical conditions to achieve change: collective efficacy, or “people’s shared beliefs in their collective power to produce desired results” (Bandura, 2000, p. 75). Collective efficacy is a group property that depends both on the characteristics of

individual members and on the shared dynamics they create together, and it is essential in collective change efforts because it can “influence the types of futures they seek to achieve through collective action, how well they use their resources, how much effort they put into their group endeavour” (Bandura, 2000, p. 76).

Following these ideas, the quadruple status of citizens –which are at the same time the villains, the victims, the potential heroes, and the audience of the drama– allows them to identify successively to the villain, to the victim and to the hero, and to experience to some degree what it would feel like to be in these roles. But the real issue here is: to whom do the citizens identify? To the mimes of course (the heroes), not to the villains who are mocked. And as we saw above in this case, the hero takes the shape of those that enforce civic behaviour and promotes compliance with collective rules. That is an illustration of the “vigilante effect”, a most powerful mechanism of behavioural channelling in the social layer of installations, where “every loyal member of the community tends to serve as a rule-enforcer *vigilante* and bring others back on track. This makes the institutional control redundant and ubiquitous” (Lahlou, 2017: 158). The narrative therefore presents heroes as civic vigilantes, a role everyone is encouraged to take, since the hero is classically the figure of projection.

What is interesting here is that those who are mocked are not punished (just made fun of), which gives them an opportunity to amend honourably: “the objective of the intervention having as tool mimes was to change the mood of passers-by through a smile, a joke, or a funny attitude” (citizen P34). In this narrative, there are no “real” villains: this is a farce where vigilantes are heroes, and no one wants to be the bad guy of the story. Interestingly, this is very close to the North American imaginary of Marvel comic stories where super-heroes are vigilantes. In the words of Spiderman, “We're not just our failures. As much as they hurt, we learn from them. Then we go out there and do our best to make up for them — Even though we never will. We save people. We save as many as we can to make up for the ones we couldn't. That's all we do.” (Loveness, 2015). Through mimesis, Michael Taussig (1992, p. 255) argues, we try to affect and acquire the power of the “Other” (in this case, citizens acquire the vigilante power of mimes).

By doing this, Mockus is not just trying to influence or educate individuals. Rather, he is appealing to the psychological contract of rights and duties that is implicit between a citizen and its community (as formed by the citizen’s perceptions). Psychological contracts, as research has shown, are essential to mediate the relationship of mutual exchanges and obligations between an individual and an organization, and include dimensions that cover both economic exchanges and “long-term exchange of socio-emotional resources” (Coyle-Shapiro, Pereira Costa, Doden, & Chang, 2019, p. 147). Willingness to engage in organizational citizen behaviour (behaviour that is

not mandatory or formally rewarded but that brings considerable benefits to an organization), is not only mediated by the current benefits that a person receives, but also among other things by the anticipation of future benefits, by trust in the organization, and by accepting the reciprocity norm (Coyle-Shapiro, 2002).

Similarly, in Mockus' terms civic culture interventions should always strengthen a sense of co-responsibility (the idea that solutions to social problems depend of many social actors and not just the State), and mutual regulation (the idea that people should be able to regulate each other to comply with norms instead of depending on police or administrative control). What is relevant here is not only an immediate personal gain or the sense that it's a citizen duty (as many policy interventions and communications campaigns seem to assume), but also the promise of better collective co-existence in the future and the trust and reciprocity expectations towards the community and the State. This explains why objects and mechanisms that promote the civic vigilante figure, co-responsibility and mutual regulation to improve collective co-existence are a common topic in most of his interventions (see for example his disguise as a "super citizen" to win his Mayoral campaign, see Falconi, 2017, p. 94). In summary, Mockus' interventions can be considered dramatized representations of actual installations of everyday life, representations that magnify, as a caricature, what is wrong and suggest what citizens could do to fix it. These are not injunctions, nor information about social norms. They *show*, literally, how different social norms are possible.

But what seems very specific of Mockus' interventions is the "gentle touch" of mockery, rather than more traditional social control devices such as clear-cut rational instructions, punishments, authority, and even shame -a style we could label "mockusery". For Vignolo, Mockus' actions are something like "...an urban code of conduct as interpreted by Charlie Chaplin" (Vignolo, 2017, p. 488). Those who do not behave well are gently mocked (mockused?) by silent mimes, rather than individually chastised, aggressed, or reprimanded. This is consistent with previous findings showing that "gentler social pressure" that reduce reactance can be as effective as "heavy-handed social pressure treatments" (Mann, 2010, p. 387). For citizens in our study, "sometimes it's better to apply pedagogical campaigns first instead of imposing fines on drivers and pedestrians, and to create awareness and work with all inhabitants" (citizen P6), and "since people couldn't understand [the message of respecting pedestrian crossings] with words, it had to be done through actions so that it stuck more in them" (citizen P72). According to Mockus, "[i]t was a pacifist counterweight' [...] 'With neither words nor weapons, the mimes were doubly unarmed. My goal was to show the importance of cultural regulations'" (Caballero, 2004).

This is accentuated also by the fact that the interventions are reported by the media by their own initiative, rather than official institutional communication campaigns. Admittedly, the mockery produces some shame (as Mockus intended), but it also allows the spectators, even if they are villains themselves, to identify with the good vigilantes. Which in turn, can be a way to prompt transformative self-reflections and still avoid raising reactance: “[the intervention] made people be more aware and be motivated to comply with those norms and to promote them” (citizen P15). It is the behaviour, not the persons, that were mocked. There was nothing personal. The intervention is very subtle in what it avoids doing: it does not blame formally; in fact it does not say a word. It rather *shows* what is wrong and what should be done.

The gentle touch of silent mockery is also associated with the ambiguity that Mockus’ interventions purposefully want to create: rather than punishments or ready-made instructions, Mockus’ interventions explicitly want to “ask questions” and let people provide their own answers. The silent mockery in this drama makes possible for people to assign their own words and meanings to the mimes, while the ambiguity lets people identify with different aspects of the intervention that are more relevant to them (and as our data showed, different aspects spanning from the pedagogical, normative, artistic, informational or behavioural were relevant for different people). As Mockus argues: “what people love most is when you write on the blackboard a risky first half of a sentence and then recognize their freedom to write the other half” (Mockus, 2015). When done right, this can link to the psychoanalytical concepts of the transference and projection (Freud, 1995), in which we can put a little bit of ourselves in these incomplete symbols, making them closer, more relatable and more influential to us.

The audience and their agency

As for the audience of this drama, the narratives we collected (especially those from citizens) appear at first to pose an almost vertical education relationship that is meant to solve the problem by having heroes (mime-artists linked to Mockus’ and the Mayor’s Office) teaching citizens that need to be reminded to behave properly: “this was done by Mayor Mockus to educate the people about the rules of traffic” (citizen P114). But to restrict Mockus’ interventions to this analysis would be a mistake.

By involving citizens as actors of the mime artist mockery, and more importantly by giving them cards to act as civic vigilantes, interventions create a very particular effect that can be better understood using the concepts of drama and ritual. As discussed above, both drama and ritual fulfil functions of social control by leveraging representations of the world as it is and as it could or

should be, and thus have a deep transformative potential²⁶ (Geertz, 1973). In ritual, “the world as lived and the world as imagined [...] turn out to be the same world, producing thus that idiosyncratic transformation in one’s sense of reality” (Geertz, 1973, p. 112). In drama, our own symbolic world is confronted and identifies with that of the characters and the play, which are often meant to communicate moral messages about what should and should not be done, many times through masks, caricatural roles and mocking ways (Houseman & Severi, 1994).

This liminal space between our own symbolic world, the symbolic world of others, and the perceived external reality of the drama, is related to the psychoanalytical concept of *transitional phenomena* by Winnicott (1953). This concept is central to psychological development since the early stages of human development because it mediates anxiety and the relationship between the internal and external worlds, and then, in adult life, configures the “substance of illusion” (Winnicott, 1953, p. 90) which is inherent to art and religion. In situations like the one that Mockus’ drama presents (and that is common in other art forms and theatre), people enter a transitional space that is not entirely their own symbolic world, but that is not entirely the objective perceptions of reality or the symbolic world of the actor, the playwright or other audience members either. Rather, it is a new “intermediate area of experience” (Winnicott, 1953, p. 90) that is sustained by both sides (my own – what is not me). After going through this space, both sides are transformed. This transformation is not always “rational” or conscious because it belongs to the symbolic world, but it is accentuated when people narrate and listen to stories about the experience. And indeed, for Augusto Boal, “theatre is born when a human being discovered that it can observe itself” (Boal, 1995, p. 13, quoted in Dundjerovic & Bateman, 2006, p. 461) in action, and this self-observation leads to self-discovery and self-education (Dundjerovic & Bateman, 2006). As neurological findings have shown, humans and other primates have mirror neuron systems that activate both when they do something themselves and also when they see someone else doing it (Cattaneo & Rizzolatti, 2009). Because of this, the motor experiences and vision that dramas provide are much more powerful for learning and transformation than just narration and imagination.

But going even further, and contrary to more traditional forms of drama that seek to purify emotions that might threaten the ruling value-system (as Aristotle’s tragedies – see Boal, 2009) or present a “finished version of the world” that makes spectators “delegate powers passively to the

²⁶ By taking a well-known cultural symbol (the mimes) and displace them from their original function (to that of civic vigilantes), the intervention seeks to influence both reality and the audience, as rituals do (Ahern, 1979).

characters to act and think in their place” (Boal, 2009, p. 63), Augusto Boal also believes that theatre can also give people the tools to change reality when “spect-actors” are allowed to take part in the drama and change the conditions presented by it.

Here, as mentioned above, the spectators can experience indirectly the projection into all the possible roles (victim, villain, vigilante) and given the suggestion to adopt the more rewarding vigilante role. In Mockus’ interventions, and through the “gentle touch” discussed above, people are given the possibility to act both as passive audience (when they watch the intervention) and also as protagonists of the story (when they narrate it to others or they must decide what to do when in a street intersection). They “are free of risk during the performance, are onlookers, are made to feel, one and all, members of a greater state community whatever their own social statuses may be, and are to learn to want to behave as they must behave to participate in a harmonious way in the social order” (Morgan, 2005, p. 192). Most importantly, they are not watching a drama representing unknown characters in a distant story, they are watching a representation of themselves, of their own everyday life.

There is a very interesting effect of “self-entheaty”, the situation where one observes one’s own behaviour from the third person-perspective, as a spectator sitting in a theatre²⁷. Self-entheaty enables to combine the involvement and belief provided by lived experience, but enables the critical perspective of third-person perspective. It is a great framework for reflexivity; the reason why it is used in digital ethnography. Self-entheaty seems to create powerful plasticity and relaxed self-criticism processes by the people watching (Lahlou, 2011a; Lee et al., 2017). Drama, and rituals exploit the collective self-display of what the community is to provoke reflexivity, which frames collective adhesion -usually to continue the same, but, as Mockus demonstrates, can also trigger change.

Indeed people are also given the tools to become super heroes vigilantes and, in the fashion of collective and public rituals, they will “often feel compelled or morally obliged to participate and to publicly show affiliation to the group” (Michaels, 2016, p. 211). From that position, they are both given a comfortable third-person perspective from which to reflect on the situation and decide to change without directly being labelled as a villain and forced to do so (which could create resistance and reactance), while also being called to action: “[the intervention] did achieve a result in people that have a real sense of belonging, achieving an interiorization, reflection and becoming an agent

²⁷ ‘Entheaty’ (from the Greek *θεάομαι*, ‘to gaze at a spectacle’, as in a theatre) to describe the situation, recently made possible by technology but recent too in Human history, where B observes a situation recorded from A’s perspective (Lahlou, 2006). Self-entheaty is the situation where one observes one’s own actions on record (Lahlou, 2011a).

of change” (citizen P177). And even when called to action, it is a dramatic action that oscillates between “farce” and “reality”, offering a safer place or, in Boal’s (2009) views, a place of rehearsal and learning about how to change the world.

Another fundamental characteristic is that this process is not done individually. Being a broad city-wide and mediatized spectacle, citizens are aware that their family, friends, acquaintances and strangers have heard about mimes or even have a civic card in their pocket, and so everyone is simultaneously made aware of the injunction to change. As Lewin (1947b) demonstrated a long time ago, changing people’s attitudes, beliefs and behaviours is much easier when they are in a group than as single individuals. The main reasons for this is the “unwillingness of the individual to depart too far from group standards; he is likely to change only if the group changes” (Lewin, 1947b, p. 273 quoted in Lahlou, 2017, p. 135), and the fact that people are aware that others received similar information and similar invitations to change.

Indeed, large-scale field experiments have shown that when people hear dramas such as radio soap-operas in groups, they are more likely to change their beliefs and attitudes than when they hear to them alone (Arias, 2015). In addition to the individual self-reflection and transformations that one might undergo when hearing privately the drama, groups create coordination based on common knowledge. In this way, “information that is known to be publicly available helps individuals to form an understanding of their shared beliefs” because it is “used to know that others received the information, and that everyone who received the information knows that everybody else that received the information knows this, and so on, creating common knowledge” (Arias, 2015, pp. 4–5). In addition to that, being in a group provides an important contrast effect that is rarely possible in private. If people feel ashamed or laugh watching a drama, discovering that others share the same reactions can strengthen them, while discovering different reactions to those of others will accentuate self-observation and reflection. This is similar to what happens in theatres, but in this case people do not need to remain silent as they would in a play: they can comment on what is happening with both acquaintances and strangers around them.

Together, these characteristics create engaging narratives and collective dialogue (Hooks, 1994, p. 129) in which “one teaches another” (Freire, 1996, p. 27) and collective decisions that create social change are taken (as Lewin, 1947 describes). Like Turner’s social dramas, they result in “an increase in what one might call social or plural reflexivity, the ways in which a group tries to scrutinize, portray, understand, and then act on itself” (Turner, 1982, p. 75). And indeed, the mime-artist intervention and others by Mockus seem to follow all of the eight lessons that Thomas and Louis (2013) draw from social psychological literature to increase collective action for social change. The mime-artist intervention is a circumspect government action that promotes peaceful participation

(lessons 7 and 8), and it's composed of disruptive actions that are still palatable to the public (lesson 6) as we saw in relation to reflexive transgressions (Vignolo, 2017). Then, both the prevalence and detail of narratives about the mime-artist intervention among citizens and the press, as well as the strong emphasis they both make on intervention goals, speak about how a leader's rhetoric (including acts and storylines) is used for mass influence and about how emphasis is put in collective goals over self-interest (lessons 1 and 3). And finally, the characters and their agency in the narratives link to harnessing group processes and social interaction to overcome apathy, promote socially meaningful behaviour and vigilance, and transform social norms (lessons 2, 4 and 5). But they avoid direct confrontation, rather they encourage identification with the vigilante and encourage civic behaviour. By doing this, they even go one step further from more traditional civic action processes: it is no longer just about advocacy or protesting to create change, it is about actively acting to transform yourself and others. And by working on these issues, the intervention ultimately contributes to the social group's capacities for self-organization and learning, which are essential dimensions to improve social sustainability (Missimer et al., 2017) and social capital (Grootaert et al., 2004).

CONCLUSIONS AND POLICY RECOMMENDATIONS

In this paper, we have analysed both the structure and the content of the narratives that two types of key actors hold about a specific urban policy that attempted to transform the behaviour of city inhabitants to achieve collective benefits (in this case, compliance with traffic rules that are associated with accidents, some of which are fatal). Using both Automated Textual Analysis techniques and manual coding of Narrative Policy Framework elements, we have described the general configuration of the narratives that citizens and the written press hold about Mockus' mime-artist intervention in the city of Bogota, Colombia. These results allowed us to identify and characterize three main areas that should inform both the research and the design of urban policy interventions that aim to influence citizens' behaviour. These areas show how narratives support intervention effects by allowing policy actors to learn about it, make sense of it and influence others with it, and also by contributing to promote collective agency (Bandura, 2000; Thomas & Louis, 2013) and improve social sustainability (Missimer et al., 2017) and social capital (Grootaert et al., 2004) among the target population.

Based on our findings for this specific case, we propose seven critical elements to address when designing behavioural policy interventions and their respective communication strategies:

i. Main narrative themes and anchors:

1. Both concrete and abstract themes are important: both concrete/operational themes (such as descriptions of the intervention events and its objective to educate people and change their actions) as well as more broad/abstract themes (such as the interpretation of civic culture and awareness objectives and the creator's role) are important when narrating interventions, although in our data the latter tends to be more frequent. This suggests that communication strategies linked to policy initiatives should not limit themselves to concrete descriptions or to abstract interpretations, but rather mix both.
2. Make sure stakeholders understand goals: descriptions and interpretations about the objectives of the intervention are one of the most important elements in narratives, especially among citizens. This reflects the idea of the mime-artist intervention creators that an understanding of the initiative and its guiding focus (civic culture) was a necessary condition to achieve an impact. Because of that, policy initiatives must invest significant resources on making sure that citizens and other policy actors understand and interpret intervention goals. This is also necessary to avoid Machiavellian interpretations and conspiracy theories. In passing, let us note that is not what "nudge" (Thaler & Sunstein, 2008) usually does.
3. Use appropriate anchors: anchors, or information that provides context and compares the intervention with other policy initiatives, are essential for people to make sense of it. These can be either themes that provide context (such as art among citizens or politics among the press), and also other policy initiatives to tackle the same or similar problems (such as the law and other citizen culture interventions). Together, these elements suggest that policy interventions should choose (and probably do so carefully) relevant anchors to allow people to make sense and interpret the intervention.

ii. The characters and their agency:

4. Make both implementors and institutional actors clear: the actors that perform the actual application of the intervention and that in this case are also its most visible and surprising feature (the mime-artists), seem to be as important as the institutional (the Mayor's Office) and individual (Mockus) heroes behind them. For citizens, the link between institutional and visible/surprising heroes seem to hold a greater relevance than the individual hero. This suggests that the actors implementing the intervention (i.e. the mime-artists, but also field workers, peer advisors or health workers in others) are important, but that sufficient information should also be provided on the institutions and individuals behind it.

5. Leverage civic vigilantes, “gentle touches” and ambiguity: the intervention transforms what could have been boring instructions, reprimands, or acts of authority (all of which might only influence some people and may provoke reactance), into a drama and a collective ritual in which spectators can identify with the civic vigilante and take distance from the “bad behaviour” and amend honourably from it. While confrontation with the villain would awake various defence mechanisms, the gentle touch of silent mockery facilitates identification with the hero and a new attitude towards the problem. Specifically, collective efficacy, or the realization that a group can change things through their actions (Bandura, 2000), seems to be the most important element of the plot that the narratives of both citizens and the press present. Ambiguity, on the other hand, allows people to project and identify with the intervention in different ways, also reducing reactance and allowing a broader range of people to engage with it.

iii. The audience and their agency:

6. Prompt collective self-observation: through this “gentle touch”, people are also given both a comfortable distance from which to reflect on the situation (as spectators of the drama), and the tools to become change themselves and others without being forced or being directly identified as villains. This links Mockus’ interventions to classic functions of drama and ritual of making explicit to all, in the public space, what should be done and what should not, in the form of a show rather than in the form of a police intervention. Liminal spaces common in drama and ritual that present both the world as is and also the world as it could be, citizens as victims-villains and also as vigilantes, as well as spectators and also protagonists, are associated with transitional spaces that make possible profound processes of collective self-observation, transformation, and reinvention of cultural conventions (with intrinsic motivation, even though that is the effect of persuasion). These processes are accentuated by narratives.
7. Create public spectacles: the fact that interventions are widely narrated by citizens and the media creates coordination and contrast effects that further reinforce their effects. In addition to individual transformation processes, which are difficult to achieve and maintain on a societal scale, people are aware that both acquaintances and strangers have probably seen and discussed the intervention. The public and collective characteristics of this drama and this ritual promotes coordination and contrast processes, further reinforcing “social or plural reflexivity” (Turner, 1982, p. 75) and transformation. This, coupled with the other characteristics of the intervention, seems to set the right conditions for people to engage

in a new type of civic action: one that is no longer based only on protesting but rather on direct action to transform everyday life.

Taken together, these areas describe the main characteristics of the narratives that were created specifically by these policy actors and specifically around this intervention. But rather than being unique to this particular case, these characteristics can be traced and complement previous research into policy initiatives, both around policy narratives and behavioural interventions. In this sense, they can contribute to both our understanding of policy and behavioural policy interventions in the city, and also to illuminate some of the ways in which Mockus' interventions can inform more successful behavioural policy initiatives. This, we hope, will ultimately contribute to a more responsible and focused use of the power of narratives for behavioural policy interventions in the city.

6. Study 3: a field experiment to test the effects of a social norm intervention based on the Installation Theory framework

This section contains the current version of Paper 3 of the project. As detailed in Section 3.2.3, this paper contains a field experiment to test the effects on behaviour of social norm interventions based on the Installation Theory framework. Specifically, we applied interventions among the drivers of a road freight transport company in Colombia and we measured fuel consumption and driving parameter alert outcomes. To inform practice, rather than testing specific psychological phenomena, a key component of the study was to measure whether our methods could produce cost-effective fuel savings in companies where regular training, incentive, control and feedback procedures were already being applied.

The paper in this case was framed to inform the eco-driving literature in transport studies discipline, and to provide a diagnosis and design method (Installation Theory) and an intervention mechanism (in this case, social norms) that could be used by real-world road freight transport companies. The paper was accepted for publication in the *Transport* journal (IF: 1.05) on the 03/08/2020 and will appear on the next issue.

Three co-authors took part in this study:

- Professor Saadi Lahlou, my supervisor, helped with conceptualization and the design of the study, with the formal analysis, and provided feedback, insights and edits during the whole process.
- Santiago Ortega, innovation expert from Colombia, supported the coordination and application of the diagnosis and the experiment, including the production of videos and other intervention materials. He also provided comments to the final manuscript.
- Dr. Viktor Skrickij, Director of the Transport Logistics Competence Centre at Vilnius Gediminas Technical University, performed the analysis of quantitative data, drafted sections of the data analysis and results parts of the paper, and provided comments to the final manuscript.

In terms of outreach, the results of this study were presented in the keynote speech of the Young Lithuanian Researchers Conference in 2020, and also in a presentation to a group of staff and students at the Faculty of Transport Engineering in Vilnius Gediminas Technical University. Currently, I am also in conversations with one of the largest road freight companies in Europe to apply these methods to their operation.

**6.1. Paper 3: “Local Determinants of Driving Behaviors: Installation Theory
Interventions to Reduce Fuel Consumption Among Truck Drivers in Colombia”**

LOCAL DETERMINANTS OF DRIVING BEHAVIORS: INSTALLATION THEORY INTERVENTIONS TO REDUCE FUEL CONSUMPTION AMONG TRUCK DRIVERS IN COLOMBIA

Paulius YAMIN^{1,2}, Saadi LAHLOU^{1,3}, Santiago ORTEGA⁴, Viktor SKRICKIJ²

¹*Department of Psychological and Behavioural Science, London School of Economics and Political Science, London, United Kingdom*

²*Faculty of Transport Engineering, Vilnius Gediminas Technical University, Vilnius, Lithuania*

³*Paris Institute of Advanced Study, Paris, France*

⁴*Public Innovation Centre, Ministry of Information and Communication Technologies of Colombia, Bogota, Colombia*

Corresponding author: Paulius Yamin, p.yamin-slotkus@lse.ac.uk

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Abstract. Eco-driving has been linked to considerable reductions in negative externalities and costs for transportation companies, employees and communities (including fuel consumption, safety and emission benefits). Nevertheless, some of the biggest challenges to its implementation are related to promoting behavioral change among drivers. This paper presents the results of three behavioral field interventions that were successful to improve fuel efficiency in heavy freight transportation. The interventions brought further improvement even though the target company already had strong training, incentive, control and feedback procedures in place. The Installation Theory framework and the Subjective Evidence-Based Ethnography technique were used to systematically analyze determinants of driving behaviors, and to design cost-effective behavioral interventions based on social norms. The effects of three interventions were then tested using a pre-test post-test control group design among 211 drivers of the company. Results show significant decreases in average monthly fuel consumption of up to 4% in month 1 and up to 4.5% in month 3. Our findings show (with certain qualifications), that the Installation Theory framework and social norm interventions can be a cost-effective method to improve fuel efficiency in road freight transport companies, even when strong training, incentive, control and feedback procedures are already in place.

Keywords: eco-driving, fuel consumption, driving behavior, Installation Theory, Subjective Evidence-Based Ethnography, social norms, behavioral interventions, field experiment.

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Author contributions

PY and SL conceived the study and were responsible for the design and development of the experiments. PY and SO were responsible for the experiment coordination and application, and for the production intervention materials. VS was responsible for the analysis of experimental data. PY wrote the first draft of the article and was responsible for data interpretation, while SL reviewed and edited the first draft. Finally, all authors reviewed and provided comments to the final draft.

Disclosure statement

Authors declare that they do not have any competing financial, professional, or personal interests.

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Keywords: eco-driving, fuel consumption, driving behavior, Installation Theory, Subjective Evidence-Based Ethnography, social norms, behavioral interventions, field experiment.

Notations

Abbreviations:

DPA – Driving Parameter Alerts

EBO(R/I) – Exposure to Behaviors and Opinions (Remote / In-Situ) intervention

FPP – First-person perspective video

GPS – Global Positioning System navigation

GSI(R) – Groups Summary Information (Remote) intervention

GSI+EBO(R/I) – Groups Summary Information + Exposure to Behaviors and Opinions (Remote / In-Situ) intervention

LSE – London School of Economics and Political Science

M - Mean

MASL – Meters Above Sea Level

RIW – Replay Interviews

ROI – Return on investment

SD – Standard Deviation

SEBE – Subjective Evidence-Based Ethnography

US – United States

Introduction

Implementing driving behaviors that promote fuel efficiency (broadly called eco-driving in the literature) have been linked to significant reductions in negative externalities and costs for both transportation companies (such as fuel and maintenance costs and accidents), employees (as they have been linked to noise reduction and overall job satisfaction, beyond reduced accidents) and communities (such as noise and emissions) (Bristow, Tight, Pridmore, & May, 2008; Gosnell, List, & Metcalfe, 2016; Walnum & Simonsen, 2015). Researchers estimate that changing driving behaviors can achieve reductions in fuel consumption and emissions of around 10% to 15% without any infrastructure or technological change (Barkenbus, 2010; Hari, Brace, Vagg, Poxon, & Ash, 2012). Furthermore, studies in countries like the U.K. predict that “only combinations of technological developments and behavioral change can deliver the deep cuts [...] required” (Bristow et al., 2008) to meet international goals on reduction of emissions in the transport sector. In the road transport sector, which is responsible for around 16.5% of global CO₂ emissions (World Health Organization, 2011) and can spend up to 70% of its operating budget in fuel costs (Kot, 2015), this could mean enormous financial and environmental benefits. And yet, the role of driving behavior tends to be

ignored in most energy and environmental policy making processes (Sanguinetti, Kurani, & Davies, 2017). One reason is the scarcity of actionable directives on how companies can make their drivers eco-drive. Research has shown how interventions based on low-cost mechanisms like incentives, goal setting, training or feedback (see Basarić et al., 2017; Ho et al., 2015; Jeffreys et al., 2016; Lai, 2015; Saboohi & Farzaneh, 2009; Sullman et al., 2015) have been successful to influence driving behaviors and reduce fuel consumption. These interventions can be effective and cost-efficient even in companies that already apply well-structured training, incentive, control and feedback procedures to influence the behavior of drivers. Unfortunately, many initiatives are applied for opportunistic or incidental reasons without an analysis of drivers' behaviors, which often leads to ineffective or inefficient interventions. Installation Theory (Lahlou, 2015, 2017) provides a framework to systematically analyze and redesign the physical, psychological and social determinants of activity from the user's perspective. This can contribute to better focus limited resources and increase their effectiveness to influence driving behaviors.

In this paper, we present the results of two field experiments that were designed to test whether behavioural interventions designed using the Installation Theory framework (Lahlou, 2015, 2017) and based on the concept of social norms (Legros & Cislighi, 2020; Tankard & Paluck, 2016; Yamin, Fei, Lahlou, & Levy, 2019) could be effective (and cost-effective) to improve fuel efficiency even when strong training, incentive, control and feedback procedures were already being applied to this end. A medium road freight transport company in Colombia was chosen as intervention context. After a section where we outline the main conceptual elements that guided our studies, we then turn to presenting the context of our intervention, and the methods and results of each of the two studies we conducted. Finally, we present a general discussion about how the Installation Theory framework and these interventions are a cost-effective alternative for road transport companies to reduce fuel costs and other negative externalities for themselves, their employees and the communities they work in.

1. Background

1.1. Eco-driving and behavioral change interventions

Definitions of eco-driving vary a lot in both academic and popular sources, broadly linking it to driving behaviors associated with fuel saving, reductions of CO₂ emissions (as correlation with other harmful emissions is not clear), and safety improvements (Sanguinetti et al., 2017). In an attempt to synthesize the inconsistent definitions of what observable behaviors constitute eco-driving in both academic and popular sources, Sanguinetti, Kurani and Davies (Sanguinetti et al., 2017) did a broad review to find a comprehensive typology that includes six categories: driving, cabin comfort, trip planning, load management, fueling and maintenance. Driving behaviors consisted of six further sub-classes: accelerating, cruising, decelerating, waiting, driving mode selection, and parking.

While there is a considerable literature on the basic technical and behavioral characteristics of eco-driving (Hof et al., 2012; Pampel, Jamson, Hibberd, & Barnard, 2015; Saboohi & Farzaneh, 2009; Sanguinetti et al., 2017) and on the main tools that can be used to diagnose it (Krishnamoorthy & Gopalakrishnan, 2008), some of the biggest challenges to its implementation are related to how to promote compatible behavioral changes among drivers (see Thijssen, Hofman, & Ham, 2014, including an exploration of demographic characteristics associated with this challenge). Furthermore, there is evidence that most drivers (including those of trucks) already have a practical knowledge of how to drive more efficiently and many tend to value environmental and resource saving goals, but that they rarely put that knowledge to practice while driving (as Lauper, Moser, Fischer, Matthies, & Kaufmann-Hayoz, 2015; Pampel et al., 2015; Schweitzer, Brodrick, & Spivey, 2008 have shown).

Different studies have focused on reducing fuel consumption in transportation companies through behavioral change interventions, including bus (af Wählberg, 2007; Strömberg & Karlsson, 2013), van (Hari et al., 2012; Siero, Boon, Kok, & Siero, 1989) and truck drivers (Schall, Wolf, & Mohnen, 2016; Sullman et al., 2015; Thijssen et al., 2014), and even airline pilots (Gosnell, List, & Metcalfe, 2016). These studies focus mainly on the effects and potential of goals and incentives (Gosnell, List, & Metcalfe, 2016), education and training (Schall et al., 2016; Sullman et al., 2015; Thijssen et al., 2014) and personalized feedback technologies (Gilman et al., 2014; Harvey, Thorpe, & Fairchild, 2013; Joo & Lee, 2014; McIlroy, Stanton,

& Godwin, 2017; Vaezipour, Rakotonirainy, & Haworth, 2015; Vagg, Brace, Hari, Akehurst, & Ash, 2013) to reduce fuel consumption.

In line with this body of literature, transportation companies often apply different methods to try to influence drivers in order to decrease the incidence of behaviors that are related to safety and efficiency concerns (such as speed excess and sudden braking and acceleration – see Farmer et al., 2010; Harbluk et al., 2007). These include training and re-training protocols, direct incentives or penalties to the best/worst drivers, and feedback and control mechanisms based on technological sensors and devices that measure performance (Bristow, Tight, Pridmore, & May, 2008; Gosnell, List, & Metcalfe, 2016; Walnum & Simonsen, 2015). Nevertheless, these initiatives are often based on opportunistic or incidental reasons rather than on a systematic analysis of the specific determinants that influence their drivers' behavior, which can lead to ineffective or inefficient interventions. As our paper aims to demonstrate, exploring in a more integral manner the current physical, psychological and social determinants that influence driver's activity can help to better focus scarce intervention resources and increase their chances of success. Installation Theory provides such a framework.

2. Theory

2.1. Installation Theory and behavioral change

Installation Theory (Lahlou, 2009, 2015, 2017) is a framework that emerged from decades of empirical research into human behavior and activity in local settings (especially those related to work) and that explores the mechanisms that complex societies rely on to produce expected behaviors among millions of people in millions of different local contexts. According to Installation Theory, the world around us is made of installations, which are “specific, local, societal settings where humans are expected to behave in a predictable way” (Lahlou, 2017). Classrooms, restaurants, or the cabin of a truck are all examples of installations, that can be understood “in the artistic sense of assembling patterns in space and time to modify the way we experience this situation” (Lahlou, 2015, p. 5). In turn, the way the situation is experienced by the subject channels them into behaving in the “appropriate” way: something we can witness for most behaviors in everyday life. Installation theory describes in detail how this behavioral compliance is obtained. Each installation is composed of three layers that come together locally to channel activity: the material physical environment (physical layer), the embodied interpretive systems (psychological layer) and social regulation (social layer). Together, the three layers support at the point of delivery of behavior, the process through which “individual needs, desires and will combine with the reality of the context to produce a behavioral outcome” (Lahlou, 2017, p. 82). Since behaviors are determined locally together by the three layers, the interventions that seek to transform those behaviors cannot expect strong and durable effects by modifying only one of the layers. Unfortunately, this is the case with many interventions: they focus partially on the physical (such as design-centered approaches and certain nudging techniques, see Sunstein, 2016), on the psychological (such as training programs and those based on attitudes and beliefs only, see Ajzen & Fishbein, 1980, p. 5 or de Leeuw, Valois, & Seixas, 2014) or on the social layer (such as many of the social norm interventions that are limited to providing normative information and/or feedback, see Miller & Prentice, 2013, p. 799). Others focus on limited aspects of these layers, or ignore their local and situated dimensions altogether to concentrate on indirect interventions (see Yamin et al., 2019).

Installation Theory also includes a general framework to analyze and redesign installations in order to achieve sustainable behavioral changes. Subjective Evidence Based Ethnography (SEBE – see Lahlou, Bellu, & Boesen-Mariani, 2015) is a technique that is especially suited to collect this kind of information. Users (here: drivers) wear at eye level (on glasses) a miniature camera as they operate. These First Person Perspective –FPP recordings are reviewed in “Replay Interviews” –RIW where users, with their memory aided by the recording, are able to explain in great detail their decisions and experience; and especially why exactly they behaved how they did. These elements can be used to redesign the three layers of the installation in order to produce the desired behavior, “taking into account opportunity windows and costs, but also the potential undesired effects which each level of intervention may bring along” (Lahlou, 2017). The power of SEBE resides in the outstanding quality of self-analysis enabled by the technique, which goes into minute details. This technique has produced spectacular results in other domains (Franks, Lahlou, Bottin, Guelinckx, & Boesen-Mariani, 2017).

2.2. Context, diagnostics and intervention design

In order to test the efficacy of the Installation Theory framework to analyze and design cost-effective interventions to influence driving behaviors and fuel efficiency, we chose a medium-sized road transportation company in Colombia. Employing around 220 drivers full time, the company specializes in the transportation of heavy cargo to and from the port of Buenaventura, one of the major commercial ports in the country. The roads the company uses to access the port from the company's headquarters and from the capital of the country consist of steep mountains (going from sea level to 1,000 meters above sea level –MASL- in the 120 kilometers between the port and company headquarters, and then from there to a road that alternates between 500 and 3,250 MASL in 450 kilometers). The company fleet consists mostly of International Eagle 9400 and Kenworth T800 truck trailers (models 2013 with Cummins ISX435 diesel engines and 2015 with Cummins ISX450 diesel engines respectively, and alternating Randon and Great Dane 3-axis trailers with a maximum load of 34 tones). Being one of the main cost drivers of the company, the fuel consumption of each individual truck and driver is closely monitored on a monthly basis.

Designing an effective and cost-efficient behavioral change intervention requires an analysis of the main physical, psychological and social local determinants of behavior that are relevant for the activity of interest (driving). Because of this, a diagnostic of the intervention context was conducted using the SEBE method described above. First-person perspective videos (FPP) and detailed Replay Interviews (RIW) were conducted with five drivers, totaling 2 hours and 29 minutes of FPP and 2 hours and 40 minutes of RIW footage. As argued by Lahlou (Lahlou, 2011), relatively small samples such as these are often enough in the SEBE method to collect relevant qualitative data. SEBE showed the potential impact of the family as a motive for safety, rather than the external financial incentives used by the company, the existence of some classic expressions related to driving culture (see below: the flip-flop), and a series of motivating elements that could be used for persuasion. Installation Theory showed that the social layer was underused while it could have great impact and pointed towards a social norm intervention, as well as the necessity to design an intervention that would remind the norm at the point of delivery, in the driving cabin. Several possibilities were considered (e.g. radio, technical prompt based on telemetries...), and the choice (below) was made on the rationale of being cheap and simple.

Detailed interviews were also conducted with the Chief Executive Officer of the company, as well as with managers and employees of the operations, security, purchases and maintenance areas. Demographic, fuel consumption and driving behavior data were also collected. The main diagnostic dimensions and insights are presented in Table 1, which details relevant driver demographics, behavioral trends, current company initiatives to influence driving behaviors, and main determinants of driving behaviors according to participants.

Table 1. Diagnostic dimensions and main insights

Diagnostic dimension	Main insights
Driver demographics	<p>At the start of the interventions, drivers in the company:</p> <ul style="list-style-type: none">- Were all male, with most (66%) aged between 31 and 45 years and having worked in the company for 2 years or less (67%).- Without related professional education. The company does not require previous experience or specialized training, just the relevant driving license (which is expensive but not difficult to get in Colombia).

Diagnostic dimension	Main insights
Current company initiatives to influence driving behaviors	<ul style="list-style-type: none"> - Incoming drivers undergo a 2-week full-time driving and mechanics training. - Re-training sessions are held once or twice a month and typically last 4-8 hours each. - Drivers are only allowed to re-fuel in the company-owned or pre-approved fuel stations, and special plastic seals are installed in tanks to prevent fuel theft. - A telematics device that measures and reports in real time to the company the local of each vehicle and certain driving parameters. Specifically, it records and produces an auditory alert when the driver exceeds pre-set speed excess, acceleration and braking parameters (of 80 km/h, 0.29 G and -0.47 G respectively). - The number of driving parameter alerts (DPAs) that each driver receives are stored by the company and combined with reports from different areas of the company (i.e. accounts, maintenance, etc.) to calculate a personal rating. Each month, the best drivers get a certificate and a gift card to buy clothes and other household items. - Drivers that exceed a certain number of DPAs per week are assigned an expert driving instructor, who accompanies them and provides feedback in 1-2 long trips.
Local determinants of driving behaviors	The most important physical, psychological and social determinants of driving behaviors for participants can be described as:
Physical	<ul style="list-style-type: none"> - Internal (controls to operate the truck, mirrors to augment the field of vision, music to avoid boredom and sleepiness, and personal decorations to make the truck feel like a second home). - External (outside mechanics of the truck, road environment and traffic signs and information, other road users).
Psychological	<ul style="list-style-type: none"> - Formal and informal training and education: drivers seem somewhat influenced by formal company training, but their main skills and knowledge comes from learning to drive trucks informally with their families and friends (most come from trucker families). - Drivers rely strongly on their acquired habits and skills, which is much more valued than new information or formal instructions. - Drivers display a very detailed technical knowledge of the truck and fuel saving but have different and often contradictory versions of what works. - Avoiding tiredness and distractions is an important source of anxiety for drivers, with many anecdotes about accidents showing its importance.
Social	<ul style="list-style-type: none"> - National traffic laws and company regulations are enforced regularly by the police and company's security area. - Drivers rarely interact with each other, except when charging and discharging trucks in some locations and through small WhatsApp groups (which they use to inform of traffic conditions and communicate informally). - Drivers rarely speak, and do not have much information about how their own driving behavior and fuel consumption compare to the rest of the company (descriptive norms). For many, the company is seen as only caring about saving money on their expense, so spending more fuel than necessary and theft are seen as justifiable. - When making driving and work decisions, important considerations for drivers include their families, the opinions they get from other drivers (which are very limited), and their perceived status among other drivers.

After identifying some of the main physical, psychological and social affordances that support current activities, the Installation Theory framework allows for interventions to be “opportunistic and target what seems the easiest layer to work on considering the available resources and the agency of the change agent” (Lahlou, 2017). This is because the same target behavior can be supported by several layers at a time (and each layer can take different configurations), but interventions will generally achieve much better effectiveness and sustainability in time with close support and control by the three layers simultaneously (Lahlou, 2017; Lahlou, Boesen-Mariani, Franks, & Guelinckx, 2015). That is because the redundancy of the layers makes the installations resilient.

In this case, we detected a shortcoming on the social layer of installations that could complement the current initiatives of the company, which were largely focused on the physical and psychological aspects.

Specifically, while drivers reported that some regulations by the company exist on driving behaviors and fuel consumption, they were not aware of how their own consumption compares to that of their peers. But what is more, they also believed that their peers judged negatively those that saved fuel (because it made the others look bad and you're only helping the company and not yourself). These elements are part of the concept of social norms (Legros & Cislighi, 2020; Tankard & Paluck, 2016), which are a popular behavioral change intervention method in the academic literature (Miller & Prentice, 2016; Paluck, 2009; Yamin et al., 2019), but which, as the Installation Theory framework, has rarely been applied to driving behaviors and fuel efficiency problems.

Social norm interventions are based on changing the perceptions that people have about how typical (how many people do or don't do something) and desirable (how many people think it's acceptable or not to do something) behaviors are for a reference group in certain situations. Recent reviews have shown how behavioral change interventions based on social norms have been effective to transform the behavior of people in a wide variety of contexts and for a wide variety of target behaviors (Darnton, 2008; John, Sanders, & Wang, 2014; Yamin et al., 2019). Indeed, social norms produce influence and group pressure.

Previous research on the topic suggests that important dimensions of these interventions include (Yamin et al., 2019):

- The *context where the intervention was applied* relative to where the target behavior happens (with *remote* interventions being applied away from that context and *in-situ* interventions being applied in it)
- The *type of normative information* given (with *group summary information* consisting of messages, usually percentages, that describe the perceptions and behavior of a group, and *exposure to behaviors and opinions* in which people see or hear other people).

Based on this framework, we decided to test the effects of two configurations that are popular in the social norm intervention literature:

- 1) *GSI(R)* – One based on giving people summary information about how their own behavior compares to that of others, away from the context where the behavior happens (a *Remote Group Summary Information* intervention, specifically using the *Personalized Normative Feedback* method, Miller & Prentice, 2016). In our study, this was done by distributing cards to each driver in the company headquarters with information on their own fuel consumption and how it compared to the company's average.
- 2) *EBO(R/I)* – Another based on exposing people to the behaviors and opinions of others, both away and in the context where the target behavior happens (a *Remote and In-situ Exposure to Behaviors and Opinions* intervention). In our study, this was done through a workshop in which drivers watched a 4-minute video in the company headquarters (*Remote*), and then received some campaign materials to decorate their trucks (*In-situ* keychains and small cabin decoration). The delivery of the information involved theatrical elements easily remembered, which the decoration used as a reminding cue.

While often used interchangeably, these two types of interventions respond to different assumptions about human behavior, social influence, and behavioral change. An important gap in the social norm literature relates to exploring the differential effects on behavior that each type of intervention can achieve in different intervention contexts (Bergquist, Nilsson, & Schultz, 2019; Tankard & Paluck, 2016; Yamin et al., 2019). We present here two case studies which were successive attempts to design the most effective intervention. Case Study one compares remote and In-situ interventions.

Case Study two combines both interventions in an attempt to increase effect and its durability.

3. Case Study 1

3.1. Research methods and experimental design for Case Study 1

So, following the results of the diagnostics of the context, we applied a first study to test whether a social norm intervention that addressed the social layer of installations could be effective to reduce further fuel consumption and problematic behaviors. Following previous research about intervention dimensions in social norm interventions (Tankard & Paluck, 2016; Yamin et al., 2019), we aimed to test whether interventions addressing the social layer of installations would be more effective in this context by including Remote Group Summary Information (GSI(R) above) or both Remote and In-situ exposure to behaviors and opinions (EBO(R/I) above). While we are aware that our design is not fit to test the discrete influence of

psychological factors, our aim here was to test the cost-effectiveness and practical viability of this method of intervention for the road transportation industry. Our focus is on testing realistically two variants of a specific method of intervention design in a particular industry, rather than clear-cut and simple interventions that allow to isolate psychological confounds in laboratory.

Taking all this into account, our first study aimed to test the following hypotheses:

- H1.1. By addressing the social layer of installations, a GSI(R) intervention will significantly reduce average fuel consumption.
- H1.2. By addressing the social layer of installations, an EBO(R/I) intervention will significantly reduce average fuel consumption.
- H1.3. By being applied closer to the target installation and using interactions rather than “argument-based” messages, an EBO(R/I) intervention will be more effective to reduce average fuel consumption than a GSI(R) intervention.
- H1.4. By being applied only a single time (i.e. each participant will be exposed to the interventions on one occasion), the effects of both GSI(R) and EBO(R/I) interventions will fade over time.

3.1.1. Participants and procedure

A total of 138 drivers of the company above successfully completed the first study (with 83 in treatment conditions and 55 in control). During the time of the study, the regular training, incentive, control and feedback procedures of the company described above continued to be applied to all drivers, which were randomly assigned to one of three conditions:

- Intervention control. Drivers that were not selected for treatment conditions 1 or 2 were included in the control group and did not receive any communication or information on our part (n=55). Rather than a no-intervention, this condition includes the drivers that only received the regular procedures implemented by the company. Because treatments 1 and 2 were not applied in the same time periods (Figure 1 below), and because our analysis required the exclusion of participants that had missing data periods (see data analysis below), the number of drivers selected for control measures was different for each of the treatments (n=43 for GSI(R) and n=42 for EBO(R/I) respectively).
- Treatment 1 (GSI(R) intervention). Remote group summary information (n=36). Drivers in this condition received a small business card with their own consumption for the last month compared to the company’s average. A small sentence congratulating them or inviting them to do better (depending on the case), was added to leverage injunctive norm perceptions. In order to increase retention of the card, we included a calendar with some of the most popular festivals in the country behind it. The cost factored in this intervention included printing the cards and the time necessary to design and distribute them (as the company already had the information required), and amounted to €70.
- Treatment 2 (EBO(R/I) intervention). Direct/remote exposure to behaviors and opinions (n=39). When stopping at the company headquarters, drivers in this condition attended a 10-minute session in which they watched a 4-minute video and received a keychain and decoration for their truck. To make it appealing and engaging like previous successful interventions (Mockus, 2002; Yamin, 2013), the intervention was based on a popular saying that emerged from the RIW interviews above. In Colombia, “giving the flip-flop” (*darle chancleta*) to a car means accelerating and generally driving fast. The intervention asked drivers to “reduce the flip-flop” (*bajele a la chancleta*, i.e. accelerating less and driving more calmly). The video displays a few of the company’s drivers in their trucks asking others to “reduce the flip flop” and describing why they thought it was important and desirable to do this for drivers (Figure 1 - a subtitled version can be accessed here:



<https://youtu.be/wylYeNZWpSQ>.

Figure 1. The EBO(R/I) intervention. *Photos were taken by the first author and display one of the co-authors, who has authorized its publication.*

After the video, drivers received a flip-flop keyring and a flip-flop decoration to hang in their truck. The cost of this intervention included the production of the video, the keyrings and decorations, and the work time required to produce the materials and implement the workshop, and amounted to €300.

Figure 2 presents the intervention procedures for this study.

		2018						
		June	July	August	September	October	November	December
TREATMENTS	{	GSI (R) intervention (treatment 1)						
		Baseline (2-month average)		Application		Month 1 post-test	Month 2 post-test	Month 3 post-test
		EBO (R/I) intervention (treatment 2)						
		Baseline (2-month average)		Application		Month 1 post-test	Month 2 post-test	Month 3 post-test
CONTROLS	{	CONTROL for GSI (R)						
		Baseline (2-month average)		GSI (R) application period		Month 1 post-test	Month 2 post-test	Month 3 post-test
		CONTROL for EBO (R/I)						
		Baseline (2-month average)		EBO (R/I) application period		Month 1 post-test	Month 2 post-test	Month 3 post-test

Figure 2. Intervention procedures for Case Study 1.

3.1.2. Measures and analysis

In order to test the hypotheses defined for this study, we collected an outcome measure related to the average monthly fuel consumption per driver. This was measured in kilometers per U.S. gallon (km/US gal) by the company using the total distance covered by each truck and the total fuel supplied to it in a given month (that is, the number of kilometers travelled with one US gallon of fuel). The data was collected to build baseline (which because of monthly averages were calculated from the average of the two months prior to the intervention) and post-test measures (at 1, 2 and 3 months after the intervention was over – Figure 2 above), which were then analyzed to test for significant differences. Because data was only available as monthly averages and because considerable logistic difficulties meant interventions took some time to be delivered to all participating drivers, we did not take into account “application” periods in the analysis.

As for the analysis of the data, we checked for normal distribution and applied paired T-tests and difference-in-differences technique. To define the data distribution law empirical skewness and kurtosis of the datasets were compared with critical values depending on the size of the sample only. The critical value of skewness was calculated using method proposed by Sivilevičius et al. (2017) and Sivilevičius & Vansauskas (2013):

$$S_{sk} = \sqrt{\frac{6n(n-1)}{(n-2)(n-1)(n+3)}}, \quad (1)$$

where n is the sample size.

The critical value of kurtosis was calculated (Sivilevičius et al., 2017; Sivilevičius & Vansauskas, 2013):

$$S_{ku} = \sqrt{\frac{24n(n-1)^2}{(n-3)(n-2)(n+3)(n+5)}}, \quad (2)$$

It is known that distribution law is normal if the conditions $|sk| \leq 3S_{sk}$ and $|ku| \leq 5S_{ku}$ are true (Sivilevičius et al., 2017; Sivilevičius & Vansauskas, 2013), here sk is skewness and ku is kurtosis, both of them are calculated using empirical data. Mean values and standard deviations of distance travelled with one gallon of fuel (km/US gal) in all the groups were calculated. If the mean value was outside the confidence interval $\pm 3\sigma$ it was not taken into account, here σ is the standard deviation. **There were 14 data samples in 3 cases out of 6 in which such data was** outside the confidence interval, for a total number of samples of 247. **Exceptions were eliminated from the data after research**, as it turned out the deviation from the mean represented the effect of changes in the driving route (strong variability in MASL) rather than the influence of intervention, and thus cannot be considered as a relevant comparison. After these quality control procedures, it was found that **the rest of the data in 6 cases is distributed according to the normal law**. That means that a Student’s T-test can be used to understand whether the difference in means within the same

group is significant and to understand whether the intervention was effective. There are three types of T-test that can be used when data distribution law is normal: variance of two samples is equal; the variance is unequal, and samples are paired. In the case under investigation paired type of T-test was used, the same drivers were investigated, just at a different point in time (before / after). To make it possible sample size should be equal. For the investigation only drivers who had fuel consumption data recorded for all the months that the experiment lasted were taken into account, which allows to track each individual accurately and control for individual differences. Unfortunately, due to the high driver rotation of the company, this was translated into an attrition rate of around 35% for both control and intervention groups.

3.2. Results for Case Study 1

3.2.1. Hypotheses H1.1, H1.2 and H1.3: effectiveness of interventions for fuel saving relative to control

As discussed in the methodology, average fuel consumptions of drivers in the intervention groups was collected to test the effects of interventions (measured with the average number of kilometers travelled with one gallon of fuel, or km/US gal). The first three hypotheses (H1.1, H1.2 and H1.3) were posed to test whether our GSI(R) and EBO(R/I) would significantly reduce fuel consumption compared to control groups (which were only receiving the usual fuel saving program of the company), and which one of the two would produce larger effects. Figure 3 present the average distances travelled with one gallon of fuel on periods 0 and 1 for GSI(R) and EBO(R/I) treatments.

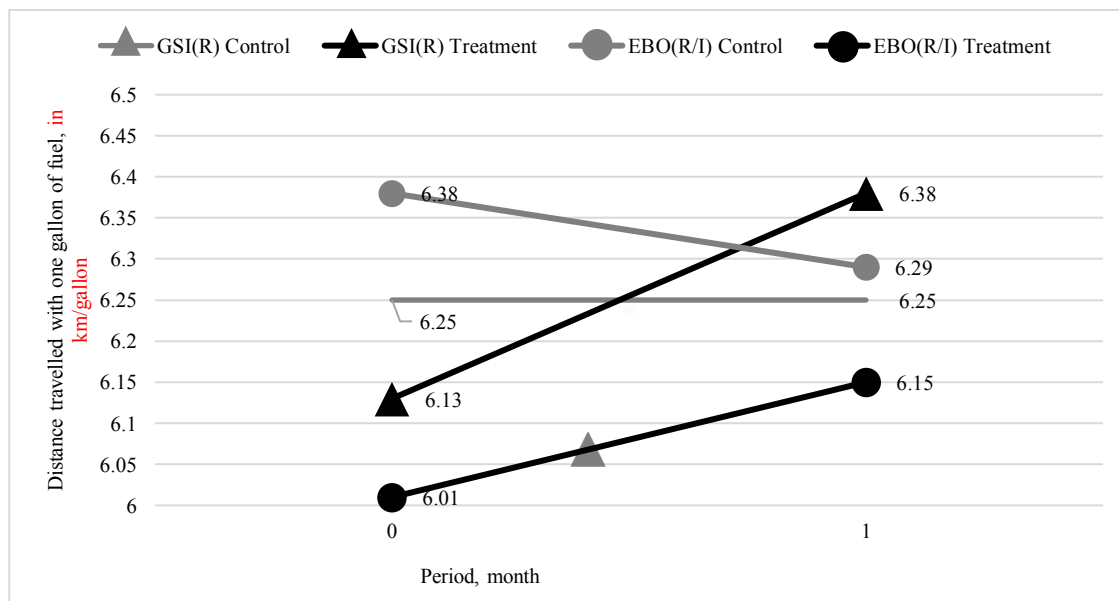


Figure 3. Distance travelled with one gallon of fuel for periods 0 (baseline) and 1 (month 1 post-test).

Taking these results, a first statistical analysis was conducted to test for significant differences between baseline and month 1 values (pre-post1). We did this by applying paired T-tests between pre and post measures in intervention and control groups. The difference can be considered significant if the calculated numerical value of T-test is less 0.05. Results for GSI(R) (treatment 1) from baseline (M=6.13, SD=0.58) and month 1 post-test (M=6.38, SD=0.61) indicate that interventions resulted in a significant increase in average distance travelled per US gallon (which is equivalent to a significant decrease in average monthly fuel consumption), $t(35) = -2.544$, $p = 0.016$. As these results show, for $n-1$ degrees of freedom (35, where n is the sample size for the test), results show a rather large negative T-score of -2.544 (which indicates a large difference between groups expressed through the ratio of the difference between the means of the two sets and the variation within the sets). Likewise, for EBO(R/I) (treatment 2) baseline (M=6.01, SD=0.42) and month 1 post-test (M=6.15, SD=0.37) also show a significant increase in distance travelled, $t(38) = -2.12$, $p = 0.041$. On the other hand, differences in control conditions for both GSI(R), $t(42) = -0.678$, $p =$

0.501, and EBO(R/I), $t(41) = 1.082$, $p = 0.286$, were not significant. Calculations for effect sizes using Klauer's method (Klauer, 2001), which corrects for unequal standard deviations and sample sizes, yield medium effects of $d_{Korr} = 0.439$ for GSI(R) and $d_{Korr} = 0.458$ for EBO(R/I). According to Coe's (2002) calculations, this means that at least 66% of the control group would be below the average driver in either of the treatment groups. These results suggest that there was a significant reduction in fuel consumption in the treatment groups, but not in control ones. Table 2 summarizes these results:

Table 2. Distance travelled in km with one gallon of fuel (month 1)

	GSI(R) (treatment 1)		EBO(R/I) (treatment 2)	
	Period		Period	
Control	0	1	0	1
Average	6.25	6.25	6.38	6.29
St. dev.	0.49	0.58	0.53	0.51
T-test		0.501 (>0.05)		0.286 (>0.05)
Treatment	0	1	0	1
Average	6.13	6.38	6.01	6.15
St. dev.	0.58	0.61	0.42	0.37
T-test		0.016 (<0.05)		0.041 (<0.05)
Effect size (d_{Korr})		0.439		0.458

Then, to study the differential effect of treatments on control groups the difference-in-differences statistical technique was applied. Results show comparable increases of about 4% for both treatments in the first month after each application (with GSI(R)=3.92% and EBO(R/I)=3.74%). In respect to our first hypotheses, then, these results indicate that both treatments are associated with significant reductions in fuel consumption (in line with our H1.1 and H1.2), but that both achieved comparable effects (contrary to hypothesis H1.3).

3.2.2. Hypothesis H1.4: the duration of the effects of interventions relative to control

Finally, our last hypothesis was designed to explore how sustainable in time the fuel savings reached by interventions GSI(R) and EBO(R/I) were. Specifically, we hypothesized that because these two interventions were applied a single time (each driver received only one card or attended only one 10-minute workshop), fuel savings would fade after over time. To test this, we analyzed the average fuel consumption data for periods 2 and 3 after the intervention. Figure 4 presents the average distances travelled with one gallon of fuel on periods 0 to 3 for GSI(R) and EBO(R/I) treatments.

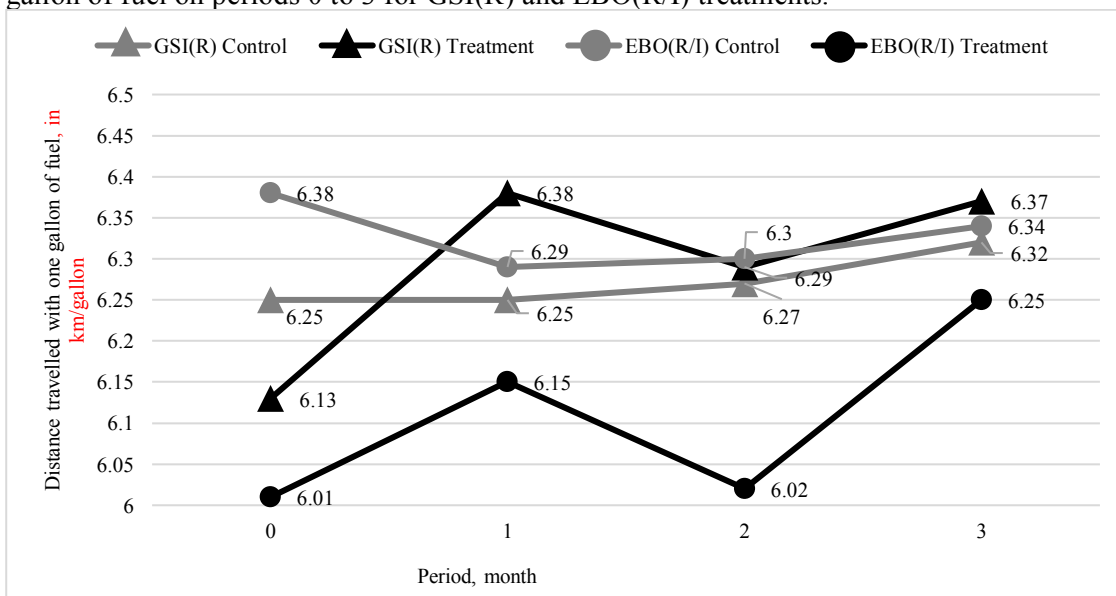


Figure 4. Distance travelled with one gallon of fuel for periods 0 (baseline) and months 1, 2 and 3.

Results show that compared to GSI(R) baseline ($M=6.13$, $SD=0.58$), there wasn't a significant reduction in fuel consumption (or increase in average distance travelled) for month 2 ($M=6.29$, $SD=0.75$), $t(35) = -1.860$, $p = 0.071$, but there was for month 3 ($M=6.37$, $SD=0.76$), $t(35) = -2.529$, $p = 0.016$. Likewise, EBO(R/I) doesn't show significant differences between baseline ($M=6.01$, $SD=0.42$) and month 2 ($M=6.02$, $SD=0.43$), $t(38) = -0.126$, $p = 0.901$, but they do between baseline and month 3 ($M=6.25$, $SD=0.54$), $t(38) = -3.011$, $p = 0.005$. For both, differences between control measures were all non-significant again. For month 3, these results yield larger effect sizes of $d_{Korr} = 0.637$ for EBO(R/I), but rather small effects of $d_{Korr} = 0.287$ for GSI(R). According to this, at least 76% of the control group would be below the average driver in EBO(R/I). Taking into account the tests for hypotheses H1.1, H1.2 and H1.3, we can conclude that both treatments are associated with significant reductions in fuel consumption for months 1 and 3, but not for month 2. The difference is more significant for EBO(R/I) than for GSI(R). This is because the amount of fuel reduction is more important and durable in EBO(R/I) as expected (almost twice as much on month 3). Table 3 summarizes these results:

Table 3. Distance travelled in km with one gallon of fuel (months 1-3)

	GSI(R) (treatment 1)				EBO(R/I) (treatment 2)			
	Period				Period			
Control	0	1	2	3	0	1	2	3
Average	6.25	6.25	6.27	6.32	6.38	6.29	6.3	6.34
St. dev.	0.49	0.58	0.80	0.78	0.53	0.51	0.79	0.78
T-test		0.501 (>0.05)	0.813 (>0.05)	0.498 (>0.05)		0.286 (>0.05)	0.509 (>0.05)	0.732 (>0.05)
Treatment	0	1	2	3	0	1	2	3
Average	6.13	6.38	6.29	6.37	6.01	6.15	6.02	6.25
St. dev.	0.58	0.61	0.75	0.76	0.42	0.37	0.43	0.54
T-test		0.016 (<0.05)	0.071 (>0.05)	0.016 (<0.05)		0.041 (<0.05)	0.901 (>0.05)	0.005 (<0.05)
Effect size (d_{Korr})		0.439	0.247	0.287		0.458	0.335	0.637

As before, we also studied the differential effect of treatments on control groups the difference-in-differences statistical technique (see Fig. 5). After period 1, results show fuel savings being reduced to 1% in period 2, and then increasing again in period 3 (reaching about 2.5% savings for GSI(R) and about 4.5% savings for EBO(R/I)).

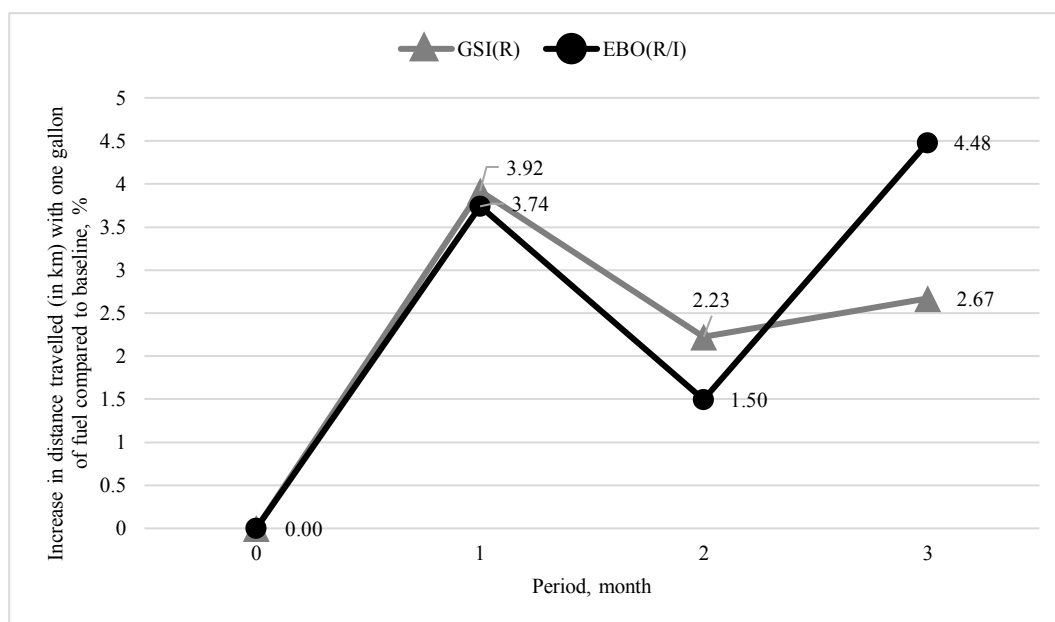


Figure 5. Increase in distance travelled with one gallon of fuel (periods 1-3).

Together, these results show that while treatment effects (savings) do seem to fade in month 2 after the intervention (in line with hypothesis H1.4), significant savings in both treatment groups appear again for month 3 (contrary to hypothesis H1.4). They also provide additional evidence around hypothesis H1.3, which referred to finding larger savings associated with EBO(R/I) than with GSI(R). According to this data, larger effects can be associated with EBO(R/I) in month 3.

3.2.3. Cost-effectiveness and Return on Investment (ROI) of the interventions

We analyzed the cost effectiveness of the intervention. We calculated the total cost of each intervention (including estimated person-hours required to design and apply the intervention, but not specialized behavioral consulting), which amounted to the equivalents of €70 for GSI(R) and €300 for EBO(R/I). Then, using average consumption, average distance and average fuel prices in Colombia, we estimated average savings compared with expected values of baseline tendencies.

For this particular company and these particular intervention groups (with 44 vehicles for GSI(R) and 39 vehicles for EBO(R/I)), we estimate the savings of the company at the end of month 3 at nearly 3,700 US gallons of fuel (which amounts to around 14,000 liters) or €8,500 per treatment condition (i.e. 7,400 US gallons and €17,000 for both). This amounts to returns on investments of 12,418% for GSI(R), and 2,821% for EBO(R/I). If applied in the whole company (rather than just the intervention groups), similar savings could amount to around 19,000 US gallons of fuel (or 72,000 liters) and €42,000. While it may appear excessive to calculate the ROI without including the consulting costs (which in this case were indeed zero for the company as the work was part of an LSE research project), the total amount of fuel savings per year (€42,000) amounts to 12 times the Colombian average annual salary.

As reference for other companies, total savings in months 1-3 would amount for around 130 US gallons of fuel (around 500 liters) per vehicle for 10,000 kms, or nearly 132,000 US gallons of fuel saved for a 1,000-vehicle fleet (in the same distance per vehicle). Table 4 presents the average US gallons of fuel saved per 1,000 kilometers per truck for each treatment.

Table 4. Average fuel savings in US gallons per 1,000 kilometers

Average US gallons of fuel saved compared to baseline and control tendencies, per 1,000 kilometers per truck	Month 1	Month 2	Month 3	Total savings months 1 - 3
GSI(R) (treatment 1)	5.28	2.64	5.28	13.20
EBO(R/I) (treatment 2)	5.28	2.64	7.93	15.85

4. Case Study 2

4.1. Research methods and experimental design for Case Study 2

After analyzing the results of Case Study 1, we decided to conduct a second study in order to test whether a more integral intervention (using relevant elements from both GSI(R) and EBO(R/I) combined) in which participants were exposed to intervention messages on more occasions could increase the magnitude and duration of the effects. To do this, we designed a single intervention condition with several components to test the following hypotheses:

- H2.1. By addressing the social layer of installations with elements from previous GSI(R) and EBO(R/I) combined, the intervention will significantly reduce fuel consumption and problematic driving behaviors compared to control.
- H2.2. By including continuous feedback and periodic messages, the effects of the intervention will remain significant for longer than those in Case Study 1 compared to control.

4.1.1. Participants and procedure

Nine months after the interventions in Case Study 1 had taken place, a total of 73 drivers of the company took part in the second study (100% male). Once again, the regular training, incentive, control and feedback company procedures continued to be applied to all drivers, which were assigned randomly to the following two conditions:

- Intervention control (n=47). Drivers that were not selected for treatment 3 did not receive any communication or information on our part.
- Treatment 3 (GSI+EBO(R/I) intervention) (n=26). Integral intervention including both GSI(R) and EBO(R/I), as well as continuous driving feedback and messages linked to the intervention. The same flip-flop concept and video were used. This time, selected drivers attended a 15-minute session in which they watched the 4-minute video of actual drivers of the company (with a few modifications to include new materials).

But then, this was also complemented with:

- A short discussion about why it was important to “reduce the flip-flop” and what everyday actions could help achieve it.
- A technological device installed in selected drivers’ truck, the “LightBox 1”, which was specifically created for this intervention by us using the open-source Arduino language. It consisted of a small plastic box that would flash 6 red LED lights around a flip-flop and a “reduce the flip-flop message” when drivers would accelerate suddenly. The hardware consisted of an Arduino Uno board and GY-521 accelerometer-gyroscope connected to 6 LED lights (Figure 6).



Figure 6. The LightBox 1. *Photo taken by the first author.*

- SMS messages sent to drivers’ mobile phones 4, 7 and 9 weeks after the video sessions including how each driver’s consumption in the last month compared to the company’s average (as in GSI(R)) as well as promotional messages linked to the flip-flop concept (e.g. a popular song with lyrics transformed to “I want to see you reduce the flip-flop”).

4.1.2. Measures and analysis

In order to test the hypotheses defined for this study, we collected average fuel consumption information as before. But in order to test whether we could identify more direct effects on driving behaviors as well, we collected data on the driving parameter alerts (DPAs) that are ordinarily registered for each individual driver by the telematics devices used by the company. Consequently, our outcome measures consisted in:

- Average monthly fuel consumption per driver measured in kilometers per U.S. gallon (km/US gal – see Case Study 1).
- Average DPAs associated with number of speed excesses, sudden accelerations and sudden braking event per 10,000 kms. The data was collected from the telematics devices that draws the data in real time from each truck computer and assigns it to specific drivers.

As before, baselines (two-month averages) and post-test measures (at 1, 2 and 3 months after the intervention) were collected. Figure 7 presents the details about how the two interventions were applied and measured:

2019				
April	May	June	July	August
GSI+EBO(R/I) (treatment 3)				
Baseline (2-month average)		Month 1 post-test	Month 2 post-test	Month 3 post-test
		Quick application		
CONTROL				
Baseline (2-month average)		Month 1 post-test	Month 2 post-test	Month 3 post-test

Figure 7. Intervention procedures for Case Study 2.

For the analysis, the same procedures as for Case Study 1 were used. Average fuel consumption data was once again found to be normally distributed, with 11 cases not being taken into account for being outside the confidence interval $\pm 3\sigma$ (once again, because deviation from the mean represents the effect of changes in the driving route rather than the influence of intervention and cannot be considered as reliable). Nevertheless, average DPA data was not found to be normally distributed (see results below).

4.2. Results for Case Study 2

4.2.1. Hypothesis H2.1: effectiveness of intervention for fuel saving and reduction of problematic behaviors relative to control

In the same way as in Case Study 1, average fuel consumption data was used to test the effects of the intervention. T-test results from the baseline ($M=5.75$, $SD=0.39$) and month 1 post-test ($M=5.91$, $SD=0.45$) indicate that interventions resulted in a statistically significant decrease in average monthly fuel consumption (or increase in average distance travelled with one US gallon of fuel), $t(25) = -2.623$, $p = 0.015$. On the other hand, differences in the control condition were not significant, $t(46) = 0.853$, $p = 0.398$. These results yield medium effect sizes of $d_{Korr} = 0.551$. According to this, at least 69% of the control group would be below the average driver in either of the treatment groups. As before, results suggest that there was a significant reduction in average fuel consumption in the treatment group, but not in control one. Table 5 summarizes these results:

Table 5. Distance travelled in km with one gallon of fuel (month 1)

	GSI+EBO(R/I) (treatment 3)	
	Period	
Control	0	1
Average	5.8	5.74
St. dev.	0.37	0.38
T-test		0.398 (>0.05)
Treatment	0	1

Average	5.75	5.91
St. dev.	0.39	0.45
T-test		0.015 (<0.05)
Effect size (d_{Korr})		0.551

Then, the difference-in-differences statistical technique was applied again to explore the differential effect of treatments on control groups (see Fig. 7). Results here show once again increases in kilometers travelled with one gallon of fuel of around 4%, which are comparable to the ones achieved in Case Study 1. In respect to average fuel consumption, then, results indicate that the GSI+EBO(R/I) intervention is associated with significant reductions in fuel consumption, and that this reduction is comparable to the one achieved in Case Study 1.

As for driving parameter alerts (DPAs), speed excesses, sudden acceleration and sudden braking events were also analyzed. Results show that unlike average fuel consumption, DPAs data is not normally distributed and looks like a log-normal distribution. The majority of drivers registered 0 events during the research. Results are summarized in Table 6, while figures of data distribution were included in the Appendix.

Table 6. Driving parameter alerts for Case Study 2

		Control				GSI+EBO(R/I) (treatment 3)			
		Period				Period			
		0	1	2	3	0	1	2	3
Distance travelled with one gallon of fuel (in km)	Average	5.80	5.74	5.61	5.82	5.75	5.91	5.63	5.92
	St. dev.	0.37	0.38	0.48	0.38	0.39	0.45	0.49	0.43
Sudden braking (events)	Average	0.55	0.40	0.39	0.50	0.82	0.65	0.39	1.68
	St. dev.	0.93	0.64	0.64	0.77	1.80	0.87	0.57	1.90
Speed excesses (events)	Average	0.85	0.52	0.36	0.91	0.74	0.63	0.38	1.55
	St. dev.	1.80	1.20	0.70	1.84	1.81	0.88	0.57	1.91
Sudden acceleration (events)	Average	0.88	0.67	0.80	0.78	0.59	0.58	0.61	0.81
	St. dev.	0.86	0.57	0.59	0.65	0.41	0.42	0.49	0.58

Following these results, we decided to investigate whether the speed excess, sudden braking and sudden acceleration data correlates with fuel consumptions. By doing this, we should have found a negative correlation: the less driving parameter alerts you receive, the more distance you will be able to travel per each gallon of fuel. Nevertheless, results show that in all the cases when averages of the group were taken into account the value of correlation coefficients were positive (Table 7). Such results are not appropriate, this means that thresholds of data loggers used during the investigation should be reset in such a way that data distribution law would be normal.

Table 7. Case Study 2, correlation of average values

Period	Control				GSI+EBO(R/I) (treatment 3)			
	Distance travelled (in km per gallon)	Accel. (events)	Brak. (events)	Speed (events)	Distance travelled (in km per gallon)	Accel. (events)	Brak. (events)	Speed (events)
0	5.80	0.88	0.55	0.85	5.75	0.59	0.82	0.74
1	5.74	0.67	0.4	0.52	5.91	0.58	0.65	0.63
2	5.61	0.80	0.39	0.36	5.63	0.61	0.39	0.38
3	5.82	0.78	0.5	0.92	5.92	0.81	1.62	1.55

Correlation coefficient		0.07	0.79	0.93		0.45	0.66	0.67
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In Table 8, we compared the correlation coefficients of distance travelled and the other measures for each driver (not just averages as in Table 7). It can be seen that in many cases value of correlation coefficient is negative, as it should be. However, absolute values are small, so it means that there is no linear correlation between these two parameters.

Table 8. Case Study 2, correlation of all drivers' metrics

Period	Control			GSI+EBO(R/I) (treatment 3)		
	Correlation Coefficient			Correlation Coefficient		
	Distance travelled to acceleration	Distance travelled to break	Distance travelled to speed	Distance travelled to acceleration	Distance travelled to break	Distance travelled to speed
0	0.146	0.049	-0.116	0.046	0.258	0.239
1	-0.123	0.257	0.087	-0.057	-0.263	-0.300
2	-0.079	0.057	-0.011	0.293	-0.043	-0.048
3	-0.141	0.018	-0.328	0.326	-0.2	-0.234

In this sense, our results show that these DPAs, at least in the way they are collected and analyzed in this particular company (which uses the device manufacturer's factory settings), are not appropriate to evaluate fuel consumption savings.

4.2.2. Hypothesis H2.2: the duration of the effects of interventions relative to control

As for Case Study 1, average fuel consumption data for months 2 and 3 after the intervention was also analyzed to explore how sustainable in time the savings were after the GSI+EBO(R/I) intervention. Following a similar trend than in Case Study 1, data shows that after the reductions on month 1 after the intervention, mean fuel consumption increased again for month 2 (and was higher than baseline level), but showed fuel savings again for month 3. Consequently, results show that compared to baseline ($M=5.75$, $SD=0.39$), there wasn't a significant change in fuel consumption for month 2 ($M=5.63$, $SD=0.49$), $t(25) = 1.369$, $p = 0.183$, but there was a significant reduction in consumption for month 3 ($M=5.92$, $SD=0.43$), $t(25) = -2.644$, $p = 0.014$. Differences between control measures were significant for month 2 ($M=5.61$, $SD=0.48$), $t(46) = 3.131$, $p = 0.003$, and significant for month 3 ($M=5.82$, $SD=0.38$), $t(46) = -0.366$, $p = 0.716$. For month 3, these results yield small effect sizes of $d_{Korr} = 0.384$. According to this, only at least 62% of the control group would be below the average driver in the treatment. Table 9 summarizes these results:

Table 9. Distance travelled in km with one gallon of fuel (months 0-3)

	GSI+EBO(R/I) (treatment 3)			
	Period			
Control	0	1	2	3
Average	5.80	5.74	5.61	5.82
St. dev.	0.37	0.38	0.48	0.38
T-test		0.398	0.003	0.716
Treatment	0	1	2	3
Average	5.75	5.91	5.63	5.92
St. dev.	0.39	0.45	0.49	0.43
T-test		0.015	0.183	0.014
Effect size (d_{Korr})		0.551	0.174	0.384

And then, as before, we studied the differential effects on treatment on control groups through the difference-in-differences statistical technique (Figure 8). Results show saving for both months in a trend that is similar to that of Case Study 1, reaching around 1% for month 2 and around 2.5% for month 3.

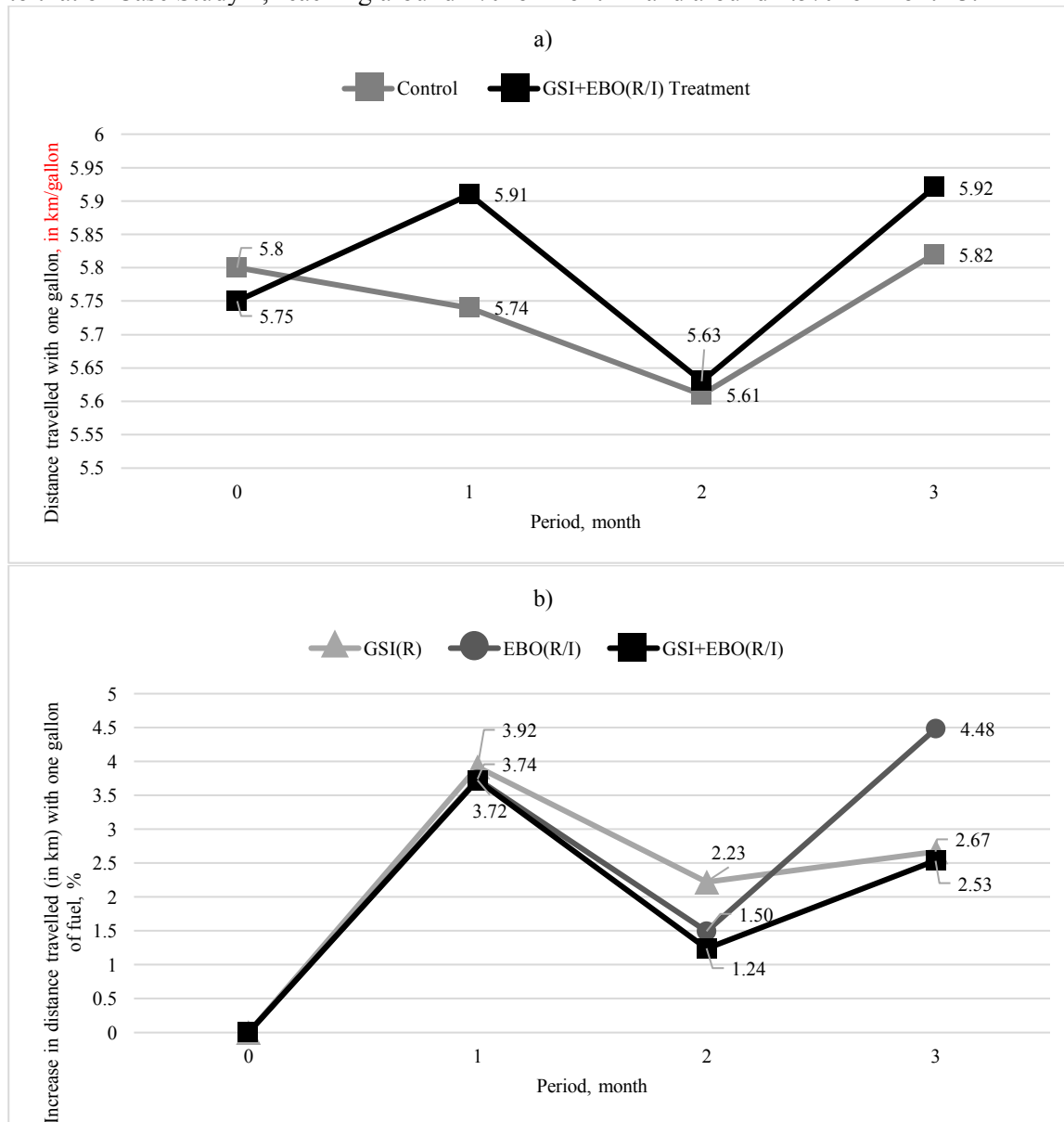


Figure 8. Distance travelled with one gallon of fuel (periods 0-3): a) GSI+EBO(R/I); b) effect of the interventions in case studies 1 and 2.

According to this, our results show that (contrary to our hypotheses) the two interventions are associated with similar savings on the first month, but the EBO(R/I) intervention is associated with larger savings over time than the other two alternatives.

4.2.3. Analysis of the cost-effectiveness and Return on Investment (ROI) of the interventions

Data in Case Study 2 was analyzed using the same procedures in our previous study to explore cost-effectiveness and ROI. The Case Study 2 intervention had a total cost of €550 (including estimated person-hours) and was applied to 26 vehicles. Our calculations estimate total savings of the company at the end of month 3 at nearly 3,000 US gallons of fuel (nearly 11,400 liters) or €6,950, which amounts to a 1,165% ROI. Estimated savings in US gallons of fuel per kilometer and truck show very similar magnitudes than in Case Study 1 (with a total at the end of month 3 of 13.21 US gallons per truck per 1,000 kilometers).

5. Discussion

By applying a field experiment in a real-world heavy freight transportation company in Colombia, this paper examined the efficacy of the Installation Theory framework and social norm interventions to improve fuel efficiency and reduce emissions. Specifically, we tested a total of three treatments, and we measured their results in terms of monthly average fuel consumption and driving parameter alerts (DPAs). Our results provide evidence for four main findings we now discuss.

5.1. About the Installation Theory framework and social norm interventions to improve fuel efficiency in freight transport.

Our results for hypotheses H1.1, H1.2 and H2.1 show that, as we anticipated, the Installation Theory Framework can be a useful method to identify effective areas for behavioral interventions to improve fuel efficiency in freight transport companies, even when training, incentive, control and feedback measures are already in place. Similarly, they show that social norms, our chosen method of intervention, is also effective to improve fuel efficiency in such conditions.

Average monthly fuel consumption is a complex outcome to influence, as it often depends on hundreds, even thousands of small actions performed over the course of a whole month. Taking into account that companies are very often already applying training, incentive, control and feedback measures to influence this outcome, creating and applying effective behavioral interventions is not easy. And although both the Installation Theory framework and social norm interventions have been shown to be effective in other contexts and for other target behaviors, they have rarely been applied to eco-driving and fuel efficiency challenges before. It is our hope that our results will open an interesting avenue of research and application for eco-driving interventions (Sanguinetti et al., 2017), that it will broaden the range of contexts and challenges for which these frameworks have shown significant results on behavior (Lahlou, Boesen-Mariani, et al., 2015; Yamin et al., 2019), and will also inform the operations of freight transport companies looking to improve fuel efficiency and reduce emissions.

Reductions in average monthly fuel consumption for the first and the total after three months (despite the changes in the second month measurements, which we will discuss below) are consistent with and of comparable magnitudes to previous social norm interventions that target other behaviors (John et al., 2014), and also with the interventions that use other methods to improve fuel efficiency (Gosnell et al., 2016; Jeffreys et al., 2016; Lai, 2015; Saboohi & Farzaneh, 2009). Nevertheless, it should be taken into account that most of these interventions are applied in contexts with no existing initiatives to change behavior or reduce fuel consumption already in place. And while more research is needed to test whether comparable effects can be reached in other contexts and using other intervention mechanisms (e.g., where social norms are not a relevant intervention option), our data shows that freight companies with similar challenges could expect considerable fuel savings and return on investments by applying these methods.

5.2. About the compared effects of the three interventions applied

But despite these positive results, and contrary to our hypotheses (H1.3 and H2.1), we didn't find evidence to support our assertion that one specific intervention would be more effective than others to reduce fuel consumption. Specifically, our data showed similar effect sizes for interventions based on GSI(R), to those based on EBO(R/I) (and even to the one that mixes both approaches in Case Study 2).

Of course, this might also be linked to the fact that in this particular context, drivers had no idea of how their own fuel consumption compared to the rest of the company before the intervention, and thus a simple card with this information could be as effective as seemingly more engaging methods. This goes against previous findings on the topic (Bergquist et al., 2019; Yamin et al., 2019), and is definitely one of the most interesting areas of research in the social norm intervention literature and practice today.

As for practitioners wanting to apply social norm interventions to improve fuel efficiency, this also suggests that if drivers don't have information about descriptive norms relating to this issue, giving simple and economical cards with personalized normative feedback can be as effective to reduce costs as more complicated interventions (which yields less risks and more returns on investment, of course).

But nevertheless, there is also an unmeasured effect here which relates to the perceptions of drivers about each intervention, and which we explored through our informal interactions and interviews with drivers after

the studies were conducted. Because while the cards in GSI(R) were seen as a “useful, but ordinary” method, the videos and other mechanisms of the other two interventions caused much more passionate reactions and expressions of support that lasted for several weeks. Arguably, interventions based on the EBO(R/I) mechanisms seemed to be more memorable and caused a stronger impression in drivers (but still, interestingly, in our context this did not translate into quantifiable fuel savings).

5.3. About the duration of intervention effects

When exploring the sustainability in time that our interventions had (hypotheses H1.4 and H1.2), the results on both our studies show significant reductions in fuel consumption for the first and third months after the intervention (including the total after month 3), but not for the second month. Actually, for all the treatment conditions, fuel consumption rises on the second month compared to the first. As we discussed previously, the literature on social norm interventions has documented how interventions that are applied on a single occasion quickly fade (Henry, 2010; Henson, Pearson, & Carey, 2015). Nevertheless, in our case the same happened with the intervention in Case Study 2, in which we added recurring text messages to drivers and the Lightbox device specifically to prevent this from happening (with no effect). This means our results didn’t provide evidence to support any of our two hypotheses related to this issue: one-time interventions in Case Study 1 achieved savings on both months 1 and 3, and repeating certain intervention mechanisms in Case Study 2 did not manage to maintain effects for the second month.

Qualitative feedback collected from drivers after data analysis points to permitting and purging behavioral spill overs as documented by Dolan & Galizzi (Dolan & Galizzi, 2015). Drivers seem to have experienced a form of ego depletion: after having felt that they already did an effort to save fuel the first month, they decided to reduce their efforts for the second. Importantly, they link this reduced effort to the fact that there were no additional face-to-face interactions or surprising actions from the company, while the repeated messages and the Lightbox devices had become ordinary and expected. Then, on the third month, they seemed to feel bad again for their low effort on the second month, which caused them to engage in a somewhat higher effort again (the moral cleansing spillover). The sustainability in time of the changes achieved by these methods is in our opinion one of the most critical issues for both research and practical applications. The specific intervention mechanisms that can achieve the enduring changes that both Installation Theory and social norm interventions aim for should be the focus of intensive research and empirical testing.

5.4. About telematics devices and driving parameter alerts (DPAs)

Telematics devices that measure and report driving parameter alerts (DPAs) are used by most major companies in the freight transport sector. Among other functions linked to their GPS capabilities, these devices are connected to vehicle computers or use separate sensors to measure parameters such as acceleration and speed. The device generates an alert each time drivers exceed pre-defined values in such parameters (in our case, number of sudden accelerations, sudden braking and speed excess events), which produce an auditory alert for the driver and are reported in real time to the company. This data is ordinarily used to inform company operations, define training, control and feedback needs (and prioritize individuals to undergo those processes), and even to inform hiring, compensation and termination decisions. In the company in our study, which is using one of the industry leaders worldwide in these type of telematics devices, the average number of DPAs that each driver gets is one of the main criteria to assign drivers to retraining procedures (if they have many) or to give them different incentives (if they have none), as well as to make decisions about the continuity in their employment.

Nevertheless, at least according to our data, the relation between DPAs and fuel consumption (which arguably is one of the main outcomes that companies are aiming to influence) is not clear. Specifically, for all the months in our data, the correlation between fuel consumption and the recorded DPAs is weak (.326 in the best case), or even negative (-.328 in the worst and most cases). The most probable explanation for this is that the range of parameters used to log DPAs are not adequate to capture differences in fuel consumption levels (which is their ultimate goal). Moreover, this might also provide a possible explanation to why the “Lightbox” intervention was less effective than the ones in Case Study 1. If sudden acceleration

alerts are not correlated with fuel consumption levels, then the visual feedback emitted by the device could be ineffective to influence relevant actions.

5.5. Limitations and further research

As any field study, our research has limitations that must be taken into account when assessing our findings. The first, most obvious one stems from the fact that our experiments were applied in a real-world context under the complex operations of a national transportation company. This imposes several practical difficulties and limitations in setting up, applying and evaluating the experiment, including the variability in routes and cargo, the high rotation rate in the company, or changes in company procedures (like the change of the telemetric operator company in the middle of experiment one, which prevented us to analyze the relevant data). We believe, nevertheless, that these limitations are largely offset by the benefits of testing our treatments in real-world operation conditions, which is of course were we hope our findings will be useful as well.

Then, there is the design of the interventions themselves, which are different to how most psychological interventions are designed and applied. Because our objective was to test the real-world effectiveness of a particular intervention framework on a particular behavioral outcome, and not to isolate specific “psychological phenomena”, our interventions are complex and mix a variety of different mechanisms (cards, videos, promotional materials, face-to-face workshops and so on). Further research could certainly be done to try to isolate the effects of these mechanisms (e.g. is a certain message more effective than others, or is a card more effective than a video with the same information?), but an important point in our view is also how the combination of these mechanisms can improve results.

And finally, another important limitation in our studies is related to the behavioral outcome measures and other information we used. Because although average monthly fuel consumption is one of the most important metrics used by transport companies to assess efficiency, as we discussed above it is also a synthesis of many behavioral and non-behavioral factors. Just in terms of driving behaviors, it is the aggregate of many actions repeated thousands of times. Furthermore, the configuration of the experiment in real-world conditions meant that collecting measures that could have acted as moderators for the results obtained would have been very difficult, if not impossible (such as distances, slope, traffic lights, weather or traffic conditions, for example). Nevertheless, the configuration of our experiment (applied over a period of 4-5 months among 211 drivers and trucks, with an approximate total of 11 million kilometres travelled in total), as well as the random assignment of participants to control and treatment groups are meant to provide some plausible control for pre-existing characteristics and external influences in psychological field experiments (see Gerber & Green, 2011). Because of these issues, further research should strive to obtain more detailed and direct data (as long as it is possible in real-world field conditions) about driving behaviors and other potential moderators of interest. Through the telemetric devices that many companies today use, the technology to do this and at least some of the behavioral data is already available (it is just a matter of calibration and of using the data).

Conclusion

In this paper, we present the results of a field study that tested the effects on fuel efficiency and driving behavior of three interventions based on Installation Theory and social norms. Interventions were tested among professional truck drivers in Colombia with data from the regular operation of a national freight transport company. Our results show that the Installation Theory framework is a useful method to identify promising intervention areas to improve fuel efficiency in road transport: here it pointed at a new layer of behavioral channeling that could be used, social norms, and to a system of making it present to the driver in driving conditions (in-situ flip-flop symbolic reminder in the truck cockpit). They also show (with some qualifications), that this framework and social norm interventions can have significant effects on fuel efficiency in real-world operations, even when strong training, incentive, control and feedback measures are already in place.

Our hope is that our research broadens the available evidence on eco-driving, Installation Theory and social norm interventions in the literature, and suggest new research areas around how focusing on local physical, psychological and social determinants of behavior (including social norms), can be an effective alternative

to promote more sustainable behaviors related to driving and other areas. And for policymakers and transport companies, we hope our findings can provide a proof of concept of the benefits they can obtain by taking seriously driving behavior and applying the Installation Theory framework to it.

Because while the transport industry is expected to shift towards electric and autonomous vehicles in the next few decades, in the meantime reducing costs associated with fuel consumption and accidents, as well as harmful emissions and noise, should be a priority of policy makers and sustainable business strategies. And also, some of these insights will definitely prove useful as well for hybrid, electric and autonomous vehicles to improve safety, efficiency and human-robot interaction outcomes (as research in this area already show).

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Appendix

1. Data distribution for DPAs in Case Study 2 (GSI+EBO(R/I) treatment and control groups)

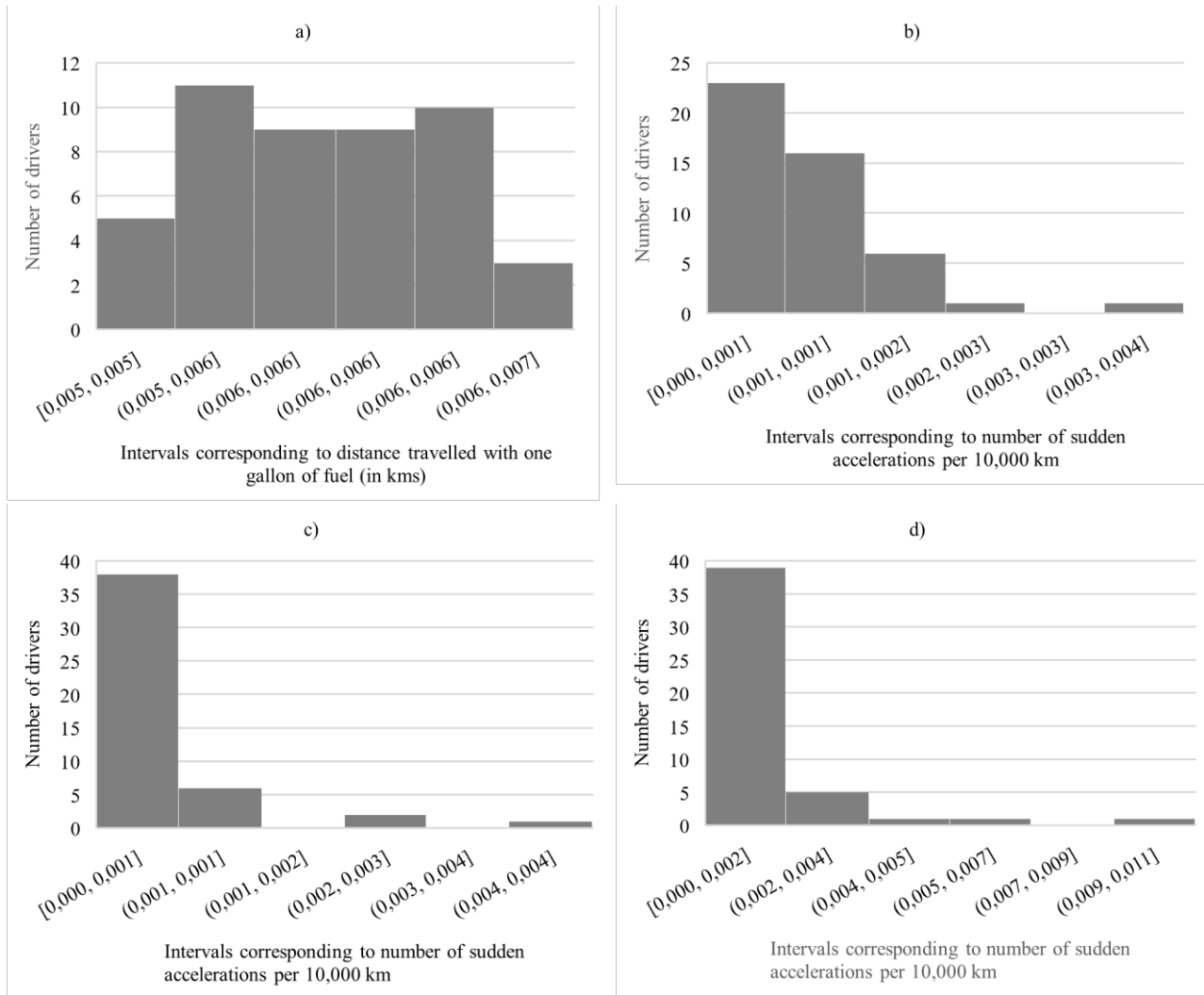


Figure 9. Data distribution for GSI+EBO(R/I) control group: a) distance travelled with one gallon of fuel; b) sudden accelerations (events per 10,000 kms); c) sudden braking (events per 10,000 kms); d) speed excesses (events per 10,000 kms)

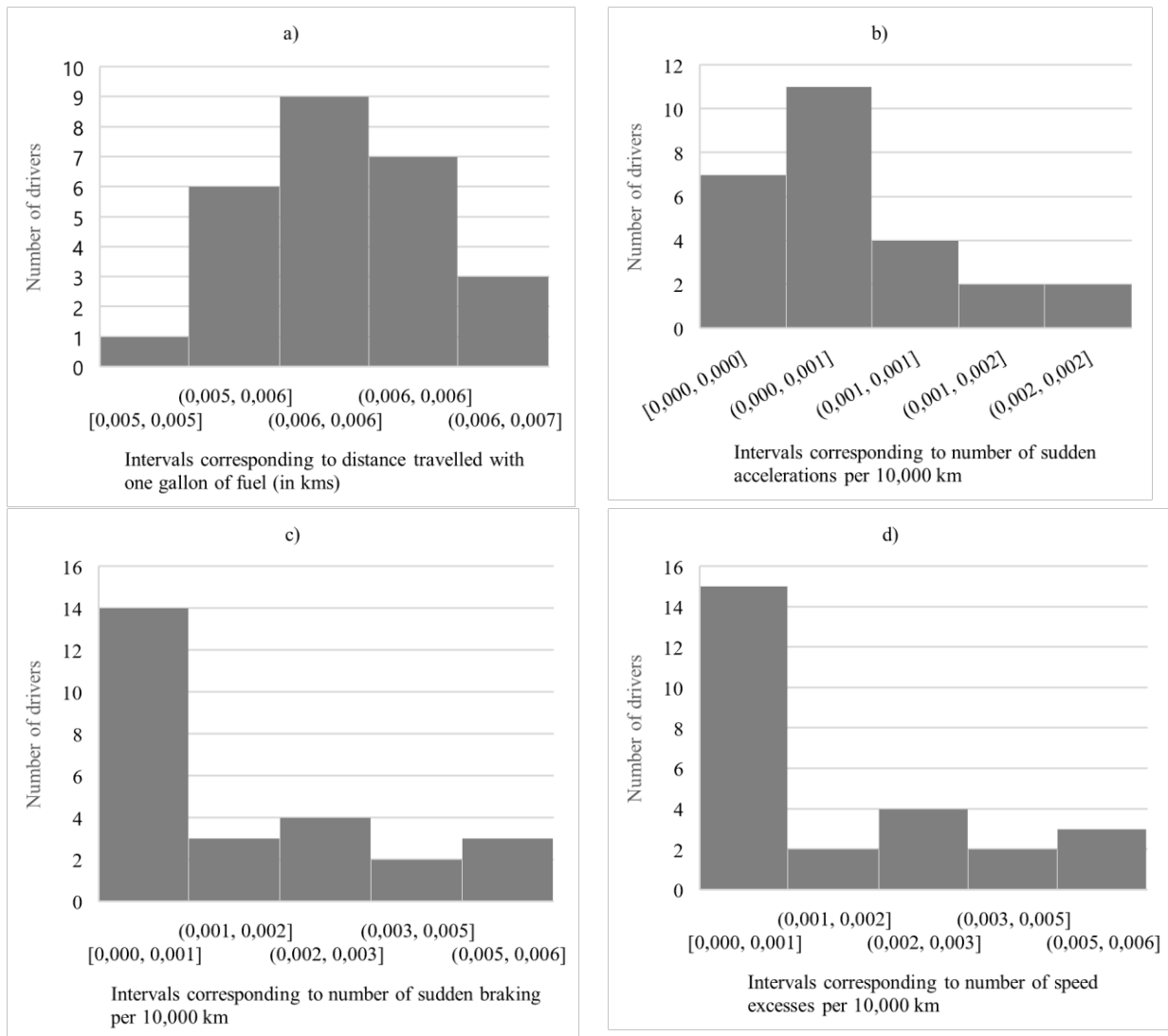


Figure 10. Data distribution for GSI+EBO(R/I) treatment group: a) distance travelled with one gallon of fuel; b) sudden accelerations (events per 10,000 kms); c) sudden braking (events per 10,000 kms); d) speed excesses (events per 10,000 kms)

7. Discussion

Si quieres cambio verdadero, camina distinto.

[If you want real change, walk differently]

Calle 13, “La Vuelta al Mundo”

(Cabra & Pérez, 2010)

In this section, I present a general discussion of some of the main findings of the three studies and of the research project as a whole. Following the focus of the project, my main preoccupation here is not only theory (which was already partially discussed in the conceptual framework and in the individual papers). My objective here is also to use these findings to discuss a few ways in which the Mockus experience could contribute to the effort of creating more effective and sustainable behavioural change interventions based on social norms to tackle social challenges in the real world. This includes recommendations for practitioners and policy makers, but also knowledge gaps and further research possibilities that should be addressed.

These findings revolve around promoting research, systematic testing and application of interventions that use a wider and more strategic range of strategies and mechanisms of intervention (Study 1 – section 7.1.), interventions that create good stories, collective self-observation and collective action (Study 2 – section 7.2.), and interventions that analyse and reconfigure the three layers of local determinants of behaviour (Study 3 – section 7.3.). For each one, I discuss implications for researchers and practitioners in these areas, while an additional section then summarizes these arguments (7.4). Of course, as an initial approximation in Mockus’ interventions, my project was concerned with a first effort to define and explore the particularities and implications of these three elements. The next step, which unfortunately exceeds the resources of this project, is to systematically test the magnitude and duration of their effects on behaviour and other relevant sociopsychological outcomes, in order to explore if, and under what conditions, such impacts can be achieved and replicated. Finally, I also present here the outreach and practical application activities I carried out as part of the project, the limitations and suggestions for further research, and some conclusions.

7.1. Towards a wider range of strategies and mechanisms of intervention

A first finding of this project is related with the wide range of strategies and mechanisms of intervention that behavioural change interventions based on social norms in the literature apply to achieve their ends. As already argued, some of these mechanisms had already been described

in popular and influential texts, including the Behavioural Change Techniques –BCT by Michie et al. (2011, 2013), the nudge types of Sunstein (2016), or the social norm intervention techniques in the work of Paluck (Paluck, 2009a), Miller & Prentice (2016) or Bicchieri (2017, pp. 142–162). Our review considerably expands the range of techniques that are specific to social norms, and provides descriptions, practical applications, and a systematic framework to better describe and interpret them.

The practical strategies and mechanisms that are used to influence behaviour in social norm interventions are not a minor issue. As we showed in Study 1, the choices that intervention designers make in this respect can drastically change how interventions are understood and experienced by participants, and even more important, the psychological and behavioural processes on which they are based. These express, for example, the fundamental distinctions between internal and external locus of control of behaviour, or the influence of normative information through argument-based messages and through social interaction (i.e., exposure to the behaviours and opinions of others). Consequently, they should not be chosen without some consideration, and they should not be omitted or simplified when reporting their results. If we want to advance both practice and research of more effective and sustainable interventions to tackle collective challenges, we cannot just assume that the dimensions and mechanisms we found (and others we did not discuss), can be used in an indistinct manner, or that they can be obscured under the general sentence “we applied a social norm intervention”.

Ideally, the wide range of intervention procedures we described in Study 1 and the framework that organizes them should inform both research and practice in several ways. The most obvious one is that it should contribute to clearer descriptions and comparisons of the specific intervention procedures that were used in social norm interventions both inside and outside academia (as is the purpose of Michie et al.’s work - 2013, 2011). But also, a wider range of options should hopefully contribute as well to the research, systematic testing and field application of more varied and more complex types of interventions. This, in turn, could mean a broader set of tools and stronger evidence about their effectiveness to tackle real-world challenges.

This includes, according to our findings, two critical dimensions to take into account when designing and applying interventions: the context in which they are applied and the type of normative information they provide. Of course, authors such as Cialdini et al. (1990), Aarts & Dijksterhuis (2003) and Lahlou (2017, p. 5) had already pointed to the importance of the context for normative and other behavioural influences, while authors like Tankard & Paluck (2016), Paluck & Shepherd (Paluck & Shepherd, 2012) and Miller & Prentice (2016) had emphasised the importance of the sources of normative perceptions for behavioural change. Our study provides a

systematic overview of how these ideas are applied in behavioural interventions, as well as a framework to describe and organize them.

As we have shown, situated, remote, group summary information and exposure to behaviours and opinions interventions are often used interchangeably and without providing clear descriptions or justifications for their use, but in reality, they answer to very different conceptions about how, when and why social norms influence behaviour. They also each have their own set of advantages and disadvantages when applied in social norm interventions. Specifically, while situated interventions modify local determinants of behaviour and allow participants to enact new behaviours, remote interventions allow easier application and more attention on the part of participants. And while exposure to behaviour and opinions makes possible demonstration and interaction, group summary information allows correcting normative misperceptions and provides clear normative trends. The latter is also easier to apply.

Convenience of intervention appears to be a major determinant in our sample, and most studies appear to use the easier remote intervention with group summary information and are using declarative data rather than measures of actual behaviour and outcomes. Another important issue (rather than finding, as this has been documented in several sources such as Arnett, 2008, and Henrich et al., 2010) is the bias that the social norm intervention literature seems to have towards simpler, argument-based interventions among students in WEIRD (Western, Educated, and from Industrialized, Rich, and Democratic countries) contexts. Typically, interventions that attempt to reduce self-reported alcohol consumption levels among students in U.S. university campuses by providing personalized group summary information graphs and percentages in web-based surveys. But although this is certainly a valuable research area, and although these studies might be easier to apply and publish, and appear to show “cleaner” psychological effects, they also often fail to leverage the huge potential that social regulation holds to achieve behavioural change in the real world.

This is course somewhat understandable in our current academic reward and publishing systems, but practitioners should not copy this trend blindly (or assume that academic interventions are too simplified for the complex real-world challenges they face). And researchers, on their turn, should strive to systematically test and produce evidence around complex interventions in complex real-world contexts. Rather than through questionnaires and percentages, everyday social regulation happens mainly through interaction, and through mechanisms that spread across social, physical and psychological determinants of behaviour (Lahlou, 2015). Further systematic testing and application of these more realistic (but indeed more challenging) interventions will not only improve our understanding of social influence processes, but will also help us to better choose

intervention procedures that might help reduce ambiguity (Lapinski & Rimal, 2005) for a wider variety of intervention contexts and problems. Our own field study (Section 6) demonstrates that such interventions that use in-situ interventions, addressing the various layers of installations and leveraging the power of narratives are feasible, and that, even if they may fail to achieve all that was planned, they nevertheless have measurable, and rather durable, impacts that can be collected using the monitoring elements already in place (and nowadays, most processes already have monitoring systems in place).

Returning to the particular case that this project explores, and to the third research question that gave rise to Study 1, this first study has provided us with the elements to assess how Mockus' initiatives compare to the social norm interventions that are regularly applied in the academic literature (but as announced, because of the focus and the output of the publication, this was only marginally discussed in Paper 1). In our review, two interventions from Mockus were included for analysis from the same paper (Mockus, 2002): one initiative to reduce residential water consumption and the mime-artist and civic card intervention analysed in Paper 2.

The results in our review do show that, as we had stated, Mockus' interventions are indeed applied through mechanisms that seem to be closer to target behaviours, both in terms of context (as they both were applied *in-situ*) and in terms of how most social regulation processes occur in everyday life (through social interactions and exposure to behaviours and opinions). Additionally, as we had also argued, both interventions create reconfigurations across the physical, psychological and social layers of installations. Nevertheless, at least for the two interventions included in our sample, we did not find the "wide variety" of intervention mechanisms that we had anticipated. Rather, they seem to have commonalities and a specific "style". Both indeed used *in-situ* and EBO dimensions, and both applied mechanisms in the three layers -in so doing they apply what our literature review suggests are the best practices; beyond that they seem to apply strategically a few features that make sense in the target context. Because while Mockus' and his followers use the term "cultural acupuncture" (Murrain & Acero, 2012, p. 139) to describe the variety of different mechanisms they usually apply to tackle the same problem (in the hope that one of them or their combination will "click" and produce the desired changes), the examples included in our sample show that the range they can take is not random but rather manages to cover the three layers of installations. This, of course, links to the redundancy issue in Installation Theory, which predicts that the channelling power and resilience of installations is increased when there is redundancy between layers of the installation (Lahlou, 2017: 159-170).

Specifically, the two interventions by Mockus' that were included in our sample both make use of 3 out of the 4 strategies (when the non-Mockus sample average is 2.3), and use between 4 and 5

of the mechanisms we identified (when the non-Mockus sample average is 2.7). This is more remarkable in that only around half of the interventions in our sample of studies apply at least one mechanism in the three layers of installations. But although these numbers do show a difference, they are not a strong differentiating factor. This suggests that rather than the sheer quantity of dimensions and mechanisms leveraged in those interventions, the differentiating factors lie on the application that is close to the point of delivery of behaviour (in-situ – EBO) and on how they cover the three layers of local determinants. These characteristics, of course, are not exclusive to Mockus and as discussed in Paper 1 there are several examples in our sample that have produced good results as well (such as Paluck & Shepherd [2012], for example).

But when speaking about Mockus' interventions, this is not the whole story. A very important element in them seems to be the creative way in which they leverage those mechanisms and determinants. Specifically, as we described before, how they seem to mobilize cultural and artistic elements (Sommer, 2006, p. 2) to create denaturalization and reinterpretation (Shklovsky, 1965, p. 3) of social problems and collective engagement around them, and how they seem to engage citizens around narratives that are told and remembered even several years after the intervention was applied. Study 2 was applied in part to explore these issues. As we show, dramatization, public reflexivity and a gentle mocking touch are key elements of Mockus' style.

7.2. Towards interventions that create good stories, collective self-observation and collective action

A second finding of our research revolves around the main characteristics and the role that narratives, and their generation, play in Mockus' interventions (as an example of behavioural policy interventions based on social norms). Narratives are essential to how we understand the world and communicate with others (Bruner, 1986, p. 11; László, Behmann, Péley, & Pólya, 2002, p. 9), and social norm interventions or policy initiatives are not exceptions. As argued before, policy actors and stakeholders (including participants) often learn, make sense and try to influence others by creating and sharing narratives around policy problems and solutions, rather than through complicated technical documents (McBeth & Jones, 2010). Studying the narratives that different policy actors have, then, can reveal a lot about how interventions are interpreted by participants and in what terms they are shared with others.

This is even more important in policy interventions that aim to influence the behaviours of citizens, since those interpretations and sharing processes can determine the intervention's success to persuade or influence participants (Walton, 2014). About Mockus' interventions, this has been

mentioned in the literature (Martin-Barbero, 2017, pp. 279–285; Mockus, 2017, p. 611) and in our interviews (see Paper 2) as one of the main elements that explain how the mime-artist intervention became a story that city inhabitants can still recall more than 20 years after it took place. By creating compelling narratives that people listen and tell over and over, the mime-artist intervention acquired a status that regular street signs, fines and other authoritative measures could never have achieved. Narratives provide the five elements of Burke’s dramatic pentad (1945, p. xv; Branaman, 2013, p. 15) that are essential for people to understand and engage sustainably with an intervention: Act (“what was done”), Scene (“when or where it was done”), Agent (“who did it”), Agency (“how he did it”), and Purpose (“why”). It is in this sense that we argued in the paper that good behavioural policy interventions create stories. Our results describe what kind.

At first sight, Mockus’ initiatives appear as social norm interventions that were applied using surprising and artistic forms to attract people’s attention and increase message retention. One can even argue, as we have done in the conceptual framework of this project, that because of that quality, people started telling stories about them to others, which led to a broader diffusion and to narrative persuasion processes to take place (Hamby, Brinberg, & Jaccard, 2016). And while all this might be true, the narratives we collected from citizens, the press and creators in Paper 2 show that there’s much more to this phenomenon than that, and the way the narratives were first played out publicly, and designed to be collectively appropriated, is original and essential. It differentiates Mockus’ interventions, which are collective happenings, from the classic behavioural interventions which aim to persuade or influence people individually. Particularly, our analysis revealed seven elements that can be used to describe the particular narratives and the particular effects that Mockus’ interventions seem to achieve. These cover three main areas: the (i) themes and anchors that are important for citizens and the press, (ii) the main characters and their agency, and (iii) the audience and their agency.

Although our analysis here is illustrated by a single case study²⁸, our findings show how studying the narratives that participants (or policy actors) have around a behavioural intervention is essential to understand its reception and impact. Assessing whether such interventions were successful or unsuccessful, trying to pin-point why, and exploring how they can be made more successful, requires engaging with the richness of interpretations that participants’ and other stakeholders’ hold about them (in addition to more traditional evaluation techniques). This aspect is often overlooked in the research about such interventions, which many times are restricted to

²⁸ But it is also informed by my several years of practical experience working in these interventions with Mockus and his followers.

closed quantitative measures and do not consider policy and intervention interpretations and narratives at all. This point, although uncommon, has already been made in relation to social norm interventions, for example when a failed replication of a social-norm intervention to reduce alcohol consumption in a U.S. campus led to a study that found that participants did not find the intervention materials to be credible or did not understand the purpose of the intervention (DeJong et al., 2006).

As this example shows, a critical point in any real-world policy intervention (including those based on social norms) is to choose, craft and disseminate the narratives that will allow citizens and other policy actors to make sense of it and understand its purpose. Often, such narratives can determine whether people understand the need and the purpose of the intervention or not, if they choose to engage and comply with it or not, and if they share it with others or not. This, of course, will have profound effects on its impact and sustainability. Clumsy interventions may be ineffective, backfire or feed conspiracy theories (see Dejong et al., 2009; Paluck & Ball, 2010, p. 43; Schultz et al., 2007).

In relation to the three areas mentioned above, results around the main themes of the narratives showed how citizens and the press use both concrete descriptions of policy problems and solutions (in a sense, the act, scene and agency), on one hand, and more abstract interpretations of impact (the purpose), on the other. This distinction has already been found in other NPF studies (see Crow et al., 2017) and speaks about the need to examine and provide explanations to what was the target problem, what was done to tackle it, and how the impact and motivation behind it can be interpreted. Among these, as anticipated by Mockus' and the designers of the interventions (see Paper 2), narratives about intervention goals are essential. In interventions that rely on producing a shock through artistic elements that denaturalize and reinterpret social problems (Shklovsky, 1965, p. 3; Sommer, 2006, p. 2), this provides a "palatable" (Thomas & Louis, 2013) explanation for its purpose and need and prevents Machiavellian interpretations that often erode their impact. According to our findings in this case, then, behavioural policy interventions based on social norms should make sure they provide both concrete descriptions of the intervention and more abstract interpretations of its effects, all while making a strong emphasis on getting participants to understand and agree on their goals.

Our results also show that citizens and the press refer to other policy interventions to make sense of the mime-artist intervention. These are important especially when intervention mechanisms are unexpected and surprising (like the mime-artists in this case), because they provide the necessary anchoring (Moscovici, 1984; Wagner et al., 1999) to interpret the intervention (for example, saying that this intervention is meant to replace this other policy solution or is similar to this policy solution). Specifically, citizens rely primarily on the law and on regulation by the police (the mime-

artist intervention replaces or complements it). They also make emphasis on how this is an artistic intervention meant to transform the city. In the case of the press, these are related to other initiatives by Mockus (the mime-artist intervention is another example of his interventions), and they also make emphasis on the political and institutional context (such and such actors opposed or supported the intervention).

Second, results about the characters and the agency assigned to them showed that citizens and the press see mime-artists as the main “heroes” that are called to solve the policy problem in question. This is not very shocking, as they are the most surprising, artistic and visible actors in the intervention. Nevertheless, results also showed how less visible agents are as important as the mimes: the Mayor’s Office and Antanas Mockus. Especially for citizens, the institutional actor behind the intervention (the Mayor’s Office), seems to be very important in relation to mime-artists. For policy designers, then, these findings emphasise that while the visible and surprising characters applying the intervention are important (i.e. the mime-artists in this case, but also field workers, peer advisors or health workers in others), the characteristics and motives of institutions and individuals behind them can be equally important for target participants and should not be obscured.

The other element of interest around characters and their agency has to do with the double status of citizens (the participants of this intervention) as both victims and villains (they both suffer and create the problem). In other PNF studies, this has been described as a constraint (Crow et al., 2017, p. 649). But in our case, both the contents and the plots of the narratives discuss specifically the need and the possibility that citizens have of acting to solve the problem. In other words, the agency that citizens have, their group efficacy (Bandura, 2000) and their potential for collective action (Thomas & Louis, 2013) are one of the main preoccupations of their own narratives around the mime-artist intervention. Emphasising the agency that participants have to transform the policy problem is indeed key to this and other civic culture interventions, and actually, it is also compatible with research on the potential of participatory approaches that foster collective dialogue and engagement in social norm interventions applied in real-world settings (Cislaghi et al., 2019; Cislaghi & Heise, 2018b), but also with organizational change research in management (Whelan-Berry & Somerville, 2010).

In this case, heroes appear as civic vigilantes that remind and promote compliance with the rules while mocking the villains. By doing so, they appeal to an implicit psychological contract (Coyle-Shapiro et al., 2019) of rights and duties between citizens and their community. People are prompted to act beyond their immediate personal interests and their formal duties, achieving a better collective co-existence through reciprocity, mutual trust and mutual regulation becomes

important. Here, identifying the citizens as villains does not mean they should be punished or reprimanded (as most superheroes would do). Rather, what we have called the “gentle touch” of silent mockery allows citizens to identify with the hero (the mime turned civic vigilante), to amend their own behaviour honourably, to engage in self-reflection and to complete the symbols and meanings that structure them. Compared to other authoritative policy interventions, to directly asking people to stop being the villain, and even compared to the most “argument-based” (Hamby, Brinberg, & Jaccard, 2016) social norm interventions that are usually applied in the literature (see Paper 1), these interventions offer people an alternative role. And by doing so, they seem to have a much bigger potential to motivate citizens for self-observation, critical reflection, and collective action. As we see that is very different from the philosophy of nudging (Sunstein, 2016; Thaler & Sunstein, 2008, p. 4), which in most cases does not require buy-in or collective learning by the targets.

Then, about the audience and their agency we also discussed how, although mime-artists (and Mockus and the Mayor’s Office) appear in many narratives as traditional teachers for citizens (Freire, 1996, p. 27), this is not the whole story. One of the central ideas of Mockus’ interventions (see Mockus, 2002) are co-responsibility (the ideas that solutions to social problems are a responsibility of many social actors and not just the State), and mutual regulation (the idea that people should be able to regulate each other to comply with norms). And because of this, the spectators of this drama (citizens) are never just passive students or spectators. By leveraging the power of ritual and drama, and that of transitional spaces (Winnicott, 1953, p. 90) and the transformations they can create, the interventions stage a collective self-entheaty²⁹, allowing citizens to sit between the safety of being part of a passive audience (which is watching itself and so is transformed in the process), and being given elements of installations to become protagonists of the story as heroes-vigilantes that can actively improve collective life in the city.

To topple those characteristics, the power of these interventions also comes from how they reinvent a phenomenon that has been central across history in domains as different as politics, entertainment, drama, or religion. The fact that, through the surprising “reflexive transgression” (Vignolo, 2017, p. 482), a public and mediatized spectacle is created, links these interventions to “collective and public rituals” (Michaels, 2016, p. 211) in which people know that others are watching both the ritual and the other members of the audience, and so many feel compelled to publicly take part and show affiliation to the group. As we discussed on Paper 2, this is linked to

²⁹ Entheaty, from the Greek *θεάομαι*, ‘to gaze at a spectacle’, as in a theatre (Lahlou, 2006). Self-entheaty is the situation where one observes one’s own actions on record. (Lahlou, 2011a)

powerful psychological processes of group change and collective decision (Lewin, 1947b), coordination through common knowledge (Arias, 2015), and self-contrast. Simultaneity of perception (the fact that people know that others are watching at the same time), but also of action (the fact that they know others are starting to act), is key here. And through it, the chances for resistance are further reduced, while the chances of critical reflection (in the form of collective self-observation) and collective action are further increased.

Together, elements in these three areas (themes, characters and audience) provide interesting areas of potential exploration, comparison and empirical testing that are important to deepen our understanding and inform the application of behavioural policy interventions, both in general and specifically for those based on social norms. In this case, this study made visible that while the varied, surprising, and creative intervention mechanisms they use are important (i.e. the mime-artists), they are not the whole story. As some of the lesser-known interventions by Mockus that were never quite understood and did not have much of an impact show, the narratives that key policy actors create and share around them are essential as well. Particularly, the key aspects seem to draw from the understanding that participants have about the concrete and abstract aspects of the intervention and its goals (including the anchors they use), by the agency that citizens have in the problem but also in their identification as heroes that can help to solve it, and by the presentation of a public spectacle that promotes collective self-observation and action. One of the main combined effects of those elements was, as we have shown, the potential of these interventions to reduce reactance to change and to increase critical reflection and collective action around the problem. The gentle touch, combined with the public reflexivity and the powerful narratives, result in a collective appropriation of the change, where citizens become actors, and even “vigilantes” enforcing the new behaviour.

7.3. Towards interventions that analyse and reconfigure social, physical and psychological determinants of behaviour

The third, final finding of the studies in this project has to do with the use of the Installation Theory framework to apply social norm interventions in real-world contexts. As discussed in relation to study 1, unlike what seems to be the trend among most social norm interventions in the literature, Mockus’ interventions typically combine intervention mechanisms in the three layers of local determinants of behaviour defined by Installation Theory. Beyond the value that the Installation Theory and social norm frameworks could have for eco-driving initiatives, which were already

discussed in Paper 3, we also attempted to test whether this type of interventions could be effective (and cost-effective) to transform a complex behavioural outcome (composed of different behaviours repeated hundreds of times over a whole month) in a complex real-world context (the everyday operation of a road freight transport company in a developing country), even when strong control, feedback and incentive measures were already in place. Also, we wanted to test whether this type of intervention could be more effective to change behaviour than a more traditional remote PNF intervention.

Despite their growing popularity, social norm interventions (or even other behavioural interventions, for that matter), are not the default change and improvement method to tackle policy and industry challenges. When faced with the challenge of transforming people's actions, organizations most often rely on introducing laws and regulations, awareness campaigns, or they create workshops and training processes (Yamin & Hobden, n.d.). Others, as is the case of the company in Paper 3, go further by also introducing control, feedback and incentive measures. These are all valuable initiatives, of course, but they are often applied without a systematic analysis of the physical, psychological and social factors that affect human activity on site. A first aim of our study was to show that Installation Theory can be a practical and effective method to do such analyses in complex conditions, and to create from them cost-effective interventions even when other initiatives are already being applied. This process is described in Paper 3, and also in the working paper produced in relation to this project for the International Labour Organization (Yamin & Hobden, n.d.).

For social norm interventions, the study shows that the Installation Theory framework can provide a more integral understanding of how normative information can support or be in contradiction to other determinants of activity, as well as a framework to organize the wide variety of practical mechanisms that can be used to leverage it (as shown in Paper 1). Furthermore, it provides some evidence to support the argument that even when more traditional control, feedback and incentive policy or organizational measures are being applied, and even in complex conditions, it still makes sense and it can still create considerable benefits to apply diagnostics and interventions based on the Installation Theory framework and on social norms. As Mockus did, leveraging local determinants of behaviour and social norms is not a panacea or a substitute of other measures. Rather, it's a complement, and one that can yield to be a good investment.

On another, more specific note, our study also attempted to explore the issue of group summary information versus exposure to behaviours and opinions (Tankard & Paluck, 2016; Yamin et al., 2019), and the issue of the sustainability in time of intervention effects. Here, as discussed in Paper 3, our findings were more complex, with some indication that the intervention that included only

exposure to behaviours and opinions applied both in-situ and remotely showed marginally better fuel consumption averages in month 3 than the ones based on remote group summary information and on both modalities combined. This is somehow in line with the indications from Paper 1 and other studies in the literature (Bergquist et al., 2019), but there remains a small difference that did not appear in previous months. Of course, a corollary here is that, as we described above, there was an important lack of information regarding descriptive norms before the application of the intervention (since drivers did not know how their own consumption compared to the company average, predictably the group summary information cards would be more relevant and have stronger effects than if they already had some idea). Further research should focus on comparing their differential effects, but also on their combined application, as each have their own set of intervention advantages as discussed in Paper 1. For practitioners, this means careful consideration should be dedicated to this when designing interventions for different targets and contexts.

Finally, by showing significant savings in months 1 and 3, but not on month 2, our interventions made visible one of the key contentious issues in social norm interventions: their sustainability in time. We were not able to improve this issue by applying an intervention with more mechanisms applied in more occasions and during a longer period, as the literature would have suggested (Henry, 2010b; Henson, Pearson, & Carey, 2015). Which suggests that, as we envisioned in the discussions of papers 1 and 2, the key to Mockus' success might not reside exclusively (or mainly) in the quantity of mechanisms applied (but rather on the gentle touch and the collective self-observation processes). These two issues, which are essential for both the literature on social norm interventions and their practical applications, should be the target of systematic testing, qualitative exploration, and long-term impact evaluations to better understand their limitations and potential. We would have wished to implement more of the Mockus drama style in our interventions, but the specific situation of drivers (always on the road and therefore difficult to gather in one place for collective self-entheaty) made this too difficult.

7.4. What Mockus' initiatives can teach us about behavioural change interventions based on social norms

The multiplication of options, rather than the elimination of them, is, again, the road to global futures.

Walter Mignolo (2011, p. 39)

This project was set to explore three elements that characterize Mockus' interventions and that set them apart from most of the interventions on the psychological literature on behavioural change interventions based on social norms. Of course, both types of interventions are similar in that they provide normative information (about typical and desirable behaviours) with the hope of transforming the behaviour of people. But they also differ in important ways, some of which we have explored in this project. Specifically, Mockus' interventions seem to profit from a closer application of mechanisms in the three layers of determinants of installations (Paper 1, Section 7.1), from surprising and creative dramas that create engaging narratives, collective self-observation and collective action (Paper 2, section 7.2), and from analysing and reconfiguring the three layers of local determinants of behaviour (Paper 3, section 7.3).

Each of these elements has implications that we have explored in the previous sections. But overall, what they all amount to is towards the need to research, apply and evaluate more diverse, situated, creative and interactive interventions than the remote, argument-based summary information interventions that seem to dominate the social-norm literature. And while there is not enough systematic empirical evidence to say conclusively that these types of social norm interventions are more effective or cost-efficient than the ones that seem to be prevalent in the social norm literature, there are good arguments in favour of expanding their systematic testing and application.

Mockus' interventions are a complex topic in themselves. They are difficult to analyse, difficult to interpret, difficult to test, and difficult to replicate -precisely because they rely on local cultural codes, and are applied, with media leverage, at the point of delivery of behaviour. The studies in this project have faced important challenges because of this. But while they are not the golden standard in social norm interventions, I believe that there are many things we can learn from them. This, predictably, is also not easy, especially through the interpretative frameworks and preconceptions of Western behavioural and psychological scientific knowledge.

Mockus' experience is the story of the exotic, strange, creative and messy cultural practices of an academic turned politician from the global South. A story that, it turns out, might help us question the hegemonic assumptions of WEIRD psychological literature on social norm interventions in several ways. And in a post COVID-19 globalized world, I believe it will become more necessary than ever in both research and practical intervention realms to take seriously Walter Mignolo's argument about how "the roads to global futures shall be thought out in the scenario of interactions, conflicts, and dialogues among coexisting options, without hoping that one of them will overcome the other and impose itself on the rest" (Mignolo, 2011, p. 43), because "...there is no reason to think that one [concept] has the right to be the universal that the seven billion people in the world shall accept [...]" (Mignolo, 2011, p. 39). This project is, in the end, a call for such a multiplication of options.

As a first point, the interventions based on the citizen-culture approach that we have reviewed in this project show that behavioural change and social norm interventions can have impressive and enduring effects on complex collective problems and in large-scale complex contexts (such as a large capital of the "third world"). That they can be a viable and cost-effective complement to more traditional intervention mechanisms meant to tackle social and industry challenges that depend on people's behaviour.

Then there is the issue of the "pedagogical balance" (Mockus, 2002). Nowadays, heuristics (Kahneman, 2012, p. 108) and nudges (Thaler & Sunstein, 2008, p. 4) have become, arguably, the dominating conceptual and intervention approach in both research and practice around behavioural analysis and change. This is especially the case in industrialized Western countries, where "nudge" units are being created by many governments and third sector organizations to improve policy applications. These are valuable and useful techniques, of course, but just as the remote group summary information interventions in paper 1, they are based on a limited view of human psychology in general and of social regulation in particular. Moreover, they are based on a limited view of the potential that behavioural change can have to produce enduring social transformations.

When most of the "nudge" intervention techniques are applied (think for example of framing nudges in Sunstein, 2016b), people are influenced through what Kahneman (2012, p. 108) describes as System 1 in an almost automatic manner. Sometimes people might not even realize that a change has happened. This is useful and can be an effective technique for some problems that require changes in restricted decisions, but it is not always the case (especially when more complex problems are involved, like deaths in traffic accidents, domestic violence or even eco-driving). On the contrary, Mockus' interventions seem to take complex social problems and apply

interventions that reconfigure determinants that are closer to where the target behaviour happens (in terms both of context -which we characterized in Paper 1 as in-situ interventions-, and in terms of how social interaction and influence develop in everyday life -which we characterized as exposure to behaviours and opinions-). Through Paper 3, we showed that this approach can produce cost-effective interventions even when more traditional techniques to influence behaviour are already being applied, and that exposure to behaviours and opinions could produce better long term results than remote group summary information (although as we mentioned the difference is still small).

But in addition to that, Mockus' interventions always struggle to leave a "pedagogical balance" (Mockus, 2002) on people, which is what they learn when an intervention is applied. As we saw in Paper 2, this balance is linked to the capacity to engage in collective self-observation about our role as citizens in social problems and in the "social consensus" that social norms express (Paluck & Shepherd, 2012) (e.g. from traffic norm compliance to homicides and domestic violence). It is linked to our own agency to solve these challenges (group efficacy), and to the possibility of getting together with others to act on them (collective action).

In this very particular way, Mockus' interventions seem to follow all of the eight lessons that Thomas and Louis (2013) draw from social psychological literature to increase participation in civic action for social change. These include (i) moving beyond individual self-interest to collective goals, (ii) harnessing group processes to promote socially meaningful behaviour, (iii) using leader's rhetoric for mass influence (including acts and storylines), (iv) overcoming apathy through social interaction, (v) transform or reinforce descriptive and injunctive norms, (vi) taking actions that are disruptive but palatable to the bystander public, (vii) generating circumspect responses from authorities, and (viii) promoting peaceful participation. And by doing this, they also address all the elements of social sustainability as defined by Missimer et al. (2017, p. 32), which include "the essential aspects of the social system that need to be sustained (that cannot be systematically degraded) for it to be possible for people to meet their needs". These aspects include the capacity for self-organization, the capacity for learning, mutual trust, common meaning and diversity, which are also important dimensions of social capital (Grootaert et al., 2004). In summary, Mockus' interventions are about much more than "just" modifying a behavioural outcome. Rather, their focus is on generating reflections around collective problems and promoting group efficacy, collective action, and social sustainability to promote enduring social and cultural transformations.

A very different type of persuasion and influence is leveraged in these interventions compared to traditional policy and normative ones. This, I believe, is key to the success that they have shown to promote transformations in complex social problems and large-scale contexts. With them, it's not

about coercing or scaring people into change (as fines and penalties often do), it's not about providing reminders (such as signs or awareness campaigns), and it is not just about convincing with rational arguments or by nudging their choices. Because as we discussed from the beginning, although these types of interventions are useful and necessary in many contexts, they are often limited to produce long-lasting social transformations. Rather, it's about promoting critical and emotional reflections about our own agency in social problems and their solutions, it's about showing that collective change is possible through creative practice, it's about prompting and giving people tools to change together without coercing them or giving them all the answers. This, I think, is the main thing that Mockus' interventions can teach other social norm interventions and also other behavioural change interventions, nudges, and even broader policy initiatives. It's the revindication of the everyday poetics of "the ordinary man. The ordinary hero. Disseminated character. Nameless walker" that disciplinary knowledge had turned into "a flexible and continuous mass, woven tight like a fabric with neither rips nor darned patches, a multitude of quantified heroes who lose names and faces as they become the ciphered river of the streets, a mobile language of computations and rationalities that belong to no one" (de Certeau & Wittgenstein, 1978, p. 3).

To summarize, there are at least five fundamental things that Mockus' interventions can teach us about behavioural change interventions based on social norms. As we have discussed before, these shouldn't be applied blindly to all contexts, but there are good arguments to test and apply them systematically in both academic and non-academic settings. Here, we have focused on how:

1. Social norm interventions can be effective to change complex behaviours in complex and large-scale contexts.
2. Social norm interventions can promote social change and social sustainability by creating collective self-observation about collective problems and social consensuses, and by supporting collective efficacy and action around them.
3. Social norm interventions can be applied away from the context where behaviours happen (remotely) and using group summary information (as seems to be the majority trend in the literature), but they can also be applied in ways that are closer to the contexts in which behaviours actually happen (in-situ) and also closer to how most social influence seems to happen in real-world contexts (through exposure to behaviours and opinions). Each of these elements has advantages and disadvantages (discussed in paper 1) that can be fostered by interventions, and that should be chosen carefully.
4. Social norm interventions can create "dramatic acts" or "situations" that reframe understandings of social reality (Benford, 2013, p. 139), unfreeze (1947a, 1947b, p. 211),

and de-naturalize (Debord, 1961; Highmore, 2002, p. 2; Shklovsky, 1965, p. 3) collective consensuses and behaviours. These dramas can give rise to appealing and engaging narratives through which policy actors make sense of interventions and share descriptions and interpretations of them. An understanding of the intervention and its goals, a “gentle touch” that allows identification with civic vigilantes (rather than punishment), and transformative collective self-observation that engenders collective action seem to be key elements.

5. Social norm interventions can, and should, analyse and reconfigure physical, psychological and social determinants of behaviour (Lahlou, 2015) through a wide variety of intervention mechanisms. By doing so, they can be effective (and cost-effective) to transform complex behavioural outcomes in complex real-world contexts, even when strong control, feedback and incentive measures are already in place.

7.5. Outreach and practical applications

Following my purpose of engaging with realms outside academia and producing research that had the potential to inform practice, I devoted a considerable part of my time and energy during the implementation of this project taking part in outreach activities and trying to contribute to practical applications. The work I did and the discussions I had while doing this were a great source of learning and improvement for the project, and they informed and significantly shaped the process, ideas and findings. For the readers interested in consulting these applications, here is a short summary and links to the resources:

- An external collaboration consultancy with the International Labour Organization –ILO (the U.N. agency for work matters) to propose practical methods to transform social norms and the behaviours of employers of domestic workers and to increase the participation and representation of indigenous and tribal women. The work drew mainly from the sample and findings in Study 1 and Annexes 1 and 2 of these framing materials, but included also materials and findings from the conceptual framework (Section 2), discussion (Section 7) and studies 2 and 3. The results of this work, which involved experts in the world headquarters in Switzerland and 8 countries around the world, will be published as an ILO working paper and in 2 papers in academic journals (see Yamin & Hobden, n.d.).
- Practical workshops with young leaders to create participative social norm and behavioural change interventions to tackle social challenges in their local contexts (using the Installation Theory framework and the methods and findings of the whole project). To

date, workshops have involved around 100 young leaders in Quibdó (one of the most vulnerable areas of Colombia), Lithuania (through the National Student Academy for “gifted” high school students: www.nmakademija.lt/eng/), and China (virtually through the www.en.viax.org platform). In Quibdó (Colombia), thanks to the crowdfunding process I did before one of my fieldwork sessions (to which many generous LSE staff and students contributed), we were able to offer the workshop free of charge, to give lunch and materials to participants, and to give them some seed funds to continue their interventions after we left.

- The creation of an online platform to connect these young leaders with each other and with experts in various areas of behavioural science and policy. The platform allows users to discuss the ideas and local solutions they are working on, to get involved in the ideas and solutions of others, to share resources and create new projects, to get mentorship and to connect to other leaders around the world. To date, there are registered members in Colombia, the UK, Germany, Lithuania and China working on 12 challenges. It can be publicly accessed through www.threefivenet.com
- Two “Behavioural Hacks” events (2019-2020) I co-organized with funding from the Knowledge Exchange and Impact fund from the LSE Department of Psychological and Behavioural Science to explore how psychological and behavioural sciences could be used to tackle real-world policy and private challenges in Lithuania. Participants were public, private and social organizations in the country, and it included practical workshops based on this project to create participative social norm and behavioural change interventions to tackle problems participants had (i.e. increasing the rate of depressed people that seek professional help with the Ministry of Health or improving the quality of medical records with Transparency International LT). Due to the COVID-19 crisis, the second version has been postponed to later this year, but already has funds, venue and speakers confirmed.
- Presentations in policy events about the aforementioned materials and the findings of studies 1, 2 and 3 in ILO events in Argentina, Lebanon and Hong Kong, as well as other events organized by local NGOs in Colombia (<https://corpovisionarios.org>) and Lithuania (<http://kurklit.lt/en/>), and by the national public administration service of Spain. In addition to this, presentations and posters in more traditional academic conferences in Colombia, Lithuania, Finland, the Netherlands, Japan, as well as the LSE Festival (including the keynote speech for the Conference for Lithuanian Young Researchers 2020).

- The formulation of the behavioural science and civic culture programmes of a campaign to Bogota's Mayor's Office (unsuccessful) and of an influential local Think-Tank in Colombia (www.alcentro.co).
- A research project with the Media and Social Norms Collaborator (a group of academic, consulting and civil society organizations) to explore how media was used as an intervention mechanism in the sample of Study 1 and in practical intervention projects around the world (from grey literature databases). A short volume is also being prepared from this work with contributions from many of the Collaborator's members.
- Publications of periodic press articles about how behavioural sciences and civic culture interventions can contribute to tackle real-world social challenges (such as corruption, domestic violence and bullying) in two of the most popular general interest and business web portals in Lithuania (www.15min.lt and www.vz.lt) in Lithuania and in the same Think-Tank's web portal in Colombia (www.alcentro.co).

7.6. Limitations and further research

As we discussed above, Mockus' interventions are a complex object of study and pose many difficulties to any attempt to systematically research and replicate them. As any project with limited resources, and even more those that venture into a complex new area like this one, our project has several limitations that should give rise to further research and better understandings in the future, both about Mockus' initiatives and other behavioural interventions to tackle social challenges. Although limitations and directions for further research have already been described in each of our studies, there are a few of them that are especially relevant to the general purpose and arguments of the whole research project. I have organized these in the following 4 topic areas.

A complex practical and conceptual artefact

A first necessary limitation of this project comes from the approach I took towards building the conceptual framework. This, of course, structured the way in which Mockus' interventions were presented and interpreted, as well as the studies devised to explore them. In my view, a complex practical artefact required a complex conceptual perspective. Specifically, although sharing an interest in behaviour and behavioural change, the different conceptual frameworks I used to structure this project (Section 2), are not an obvious choice or one that has clear precedents.

Mockus' interventions, although guided by academic perspectives from philosophy, pedagogy, politics and art, are primarily practical policy experiences that were applied with a practical rather than research purpose (i.e., to improve co-existence and civic culture in Bogotá and Colombia). Interpretation, research and building profound links with theories of mind, of politics and of social change came later, and are still being developed. Because of that, forcing a single coherent theoretical lens on them (even the ones Mockus' embraces), would have unfairly reduced both the complexity of Mockus' interventions and the project's potential to produce insights that could inform practical applications.

Rather, this conceptual framework was constructed by trying to make sense of discrete elements through different existing theoretical frameworks and previous findings drawn mainly from the psychological and behavioural literature (with elements from sociology, anthropology, cultural studies, policy and art theory as well). These discrete elements (such as social norms, intervention techniques, narratives, drama and installations), although popular and accepted in the academic literature, come mainly from elements that I discovered to be essential through my own personal experience trying to apply similar initiatives in real-world contexts, as well as from my conversations with people involved in them (including Mockus himself) and with other experts over several years.

Because of all this, the conceptual framework I built here to understand these practical experiences can certainly be improved and developed with both theoretical and empirical contributions, and even by applying and adapting it to other behavioural change initiatives to tackle social challenges. Furthermore, other conceptual frameworks have and could potentially be used to understand them, in both psychology and many other disciplines. Looking for fertile links that connect different disciplinary perspectives could produce some of the most useful insights in this area. As the volume discussing Mockus' experiences from a wide array of disciplinary perspectives show (Tognato, 2017, p. 11), when trying to make sense of complex realities, relying on many different lenses and their combinations can produce much better insights than using just one.

Limited focus of each study

A second set of limitations of the project has to do with its focus and its reach, which is inevitably restricted. As discussed from the introduction, among the many disciplines and elements of interest that have and could be used to better understand Mockus' interventions, I chose a perspective based on psychological and behavioural science and social psychology to explore issues

around intervention mechanisms, narratives and local installations. Furthermore, I choose to do so with the particular methods and the research designs described for each of the three studies in Section 3, which also explains the reasons behind the choices made to structure them. As discussed before, these choices were informed both by my practical experience working with Mockus' methods in field settings and by gaps in relevant literature bodies, with a focus on trying to inform practice.

As in all research projects, this meant we could not focus on many other interesting perspectives that could be the focus of further research. This goes from the broader level (disciplines and conceptual frameworks), to the most restricted one (study designs, methods and samples). Typically, for Mockus' interventions this includes perspectives from cultural and art theory, sociology, philosophy and public policy (see Elster, 2010, p. 104; Mackie, 2017; Sommer, 2006, p. 2; Tognato, 2017; Yamin, 2012). As for psychological perspectives, more in-depth explorations around almost all of the basic concepts that structure popular theories of behaviour and behavioural change identified in Section 2.1.1 could provide invaluable insights as well. And in a broader sense, also, the articulation of civic culture and social norm interventions with other types of policy interventions (e.g. legislative changes, police control, economic incentives, educational initiatives) is a fertile and necessary ground as well.

As for the three studies, important limitations discussed in each of the papers include the way the sample in Paper 1 was built (based on academic papers collected mainly by title keywords), the particular intervention and policy actors we choose to examine in Paper 2 (the mime-artist intervention in press and citizen narratives), and the case study chosen for Paper 3 (fuel consumption in a transportation company). For Paper 1, further research would especially benefit from either producing more in-depth analyses of homogeneous behavioural targets or contexts (as Bergquist et al., 2019, have done), or using an even broader sample that includes a wider range of academic texts such as posters, book chapters and dissertations, the rich practical experiences contained in grey literature sources (i.e. The Communication Initiative Network, 2020), and eventually also including behavioural interventions that are based on other frameworks beyond social norms. For Paper 2, further research would especially benefit from studying a wider range of interventions using representative samples of the target population. Of special interest in this respect should be exploring the commonalities and differences that these and other elements display across different interventions. And for Paper 3, assessing a larger number of behavioural and non-behavioural measures, as well as applying the proposed frameworks on other behavioural targets or contexts, would prove especially useful.

Emphasis in academic literature and experiences

A third area of limitations of this project is the fact that all our studies rely primarily in frameworks and experiences drawn from the academic literature. This was a conscious decision motivated by the desire to explore in depth the links between Mockus' experiences and popular academic traditions in the psychological and behavioural sciences (especially the social norm literature), which also made possible to restrict the project to a manageable scale. But nevertheless, I firmly believe that the experiences and knowledge contained in grey literature sources about social norm interventions could offer many invaluable insights as well. These interventions are often applied by civic society organizations, international cooperation institutions and public bodies, and can be typically found on institutional reports rather than academic publications.

This limitation is especially visible for Paper 1, in which assessing grey literature sources would enrich substantially the range of strategies and mechanisms we discussed. Indeed, the work with the "Media and Social Norms Collaborator" described in section 7.5 above included a first comparison between the intervention mechanisms and media use of the interventions in the sample from Paper 1, with popular practical interventions that have not been published in academic outlets (drawn from grey literature databases such as the ALiGN Platform and the Soul Beat Africa Network, see ALiGN, 2020b and The Communication Initiative Network, 2020). These interventions are not limited by what is "publishable", a filter that creates limitations both at design level and at acceptance for publication. If publishability had been a requisite, it is unlikely Mockus' interventions would have been what they are. Preliminary results show a much greater variety of mechanisms both within and between interventions. Future research should focus on these types of materials to complement our framework or produce one that is better suited to the particularities of such experiences.

Intervention efficacy

Finally, the last set of limitations has to do with the fact that our project did not attempt a systematic testing of the efficacy, the limitations and the advantages of the main elements we described and the main findings we obtained. Since our goal was to define and describe elements that differentiate Mockus' interventions from other social norm interventions that are typical in the literature, an essential next step is to systematically test whether (and under what conditions) our findings can be linked to the increased efficacy and sustainability that Mockus' interventions seem to show.

To do this, further research could apply our findings using a broader range of contexts, experiences or materials, and could apply systematic tests of the effects achieved by them as compared with popular mechanisms in the literature. Particularly for Paper 1, this could imply conducting proper meta-analyses on more focused samples or applying field studies to test the effects of various combinations of strategies and mechanisms of intervention (beginning with the basic in-situ/remote and group summary information/exposure to behaviours and opinions distinctions). As an example, Bergquist et al. (2019) have applied a meta-analysis on social norm interventions focused on pro-environmental behaviours, finding some evidence that “implicit” social norms (similar to exposure to behaviours and opinions) can be linked to greater effects than those based on “explicit” social norms (similar to group summary information). For Paper 2, exploring the narratives of different interventions and applying field studies of different narrative characteristics (beginning by their presence or absence) could yield illuminating results. And for Paper 3, it could imply larger randomized field experiments comparing interventions that address different layers of determinants of behaviours. Together, such investigations could provide solid arguments and qualifications about the efficacy of these elements in social norm interventions.

7.7. Conclusions

A man walks by with a loaf of bread on his shoulder
Am I going to write, later, about my double?

Another one sits down, scratches, pulls a louse out of his
armpit, kills it
With what courage to talk about psychoanalysis?

Another has entered my chest with a stick in his hand
Talk later to the doctor about Socrates?

César Vallejo (2020, p. 323, *my translation*)

It's unbecoming to write a text about real-world interventions with an orientation on social psychological research and not quote Kurt Lewin's famous sentence: “research that produces nothing but books will not suffice” (Lewin, 1946, p. 35). The quote comes from a 1946 paper in which Lewin discusses action research. There, he describes how he was contacted by “a great variety of organizations, institutions, and individuals who came for help in the field of group relations” (Lewin, 1946, p. 34), and came to the conclusion that despite a good amount of goodwill and readiness to do something to improve problems in that area, “[t]hese eager people feel to

be in the fog” (Lewin, 1946, p. 34) regarding what is the present situation of the problem, what are its dangers, and “most important of all” (Lewin, 1946, p. 34) what shall they do about it. It is in this context that Lewin calls for “research which will help the practitioner” (Lewin, 1946, p. 34), which leads to social action and actively tests social change.

In this work, we have explored three critical factors that seemed to distinguish the civic culture initiatives by Antanas Mockus from the social norm interventions that are typically applied in the academic literature. These factors, which have clear developments and gaps in the psychological and behavioural literature, include the practical intervention strategies and mechanisms used to achieve behavioural change (Study 1 – Paper 1), the narratives through which participants and other key actors interpret and disseminate intervention messages (Study 2 – Paper 2), and the intentional reconfiguration of the physical, psychological and social determinants of behaviour in local settings (Study 3 – Paper 3).

More specifically, through the first study my co-authors and I were able to explore, describe and propose an analytical framework for the wide variety of intervention strategies and mechanisms that are used in behavioural change interventions based on social norms in the literature. Among other topics, we noticed how Mockus’ interventions seem to be applied closer to the context where the target behaviour takes place (privileging social interaction in-situ), and to make strategic use of mechanisms that reconfigure the three layers of local installations. This suggests that both practice and research could benefit from more informed and from more systematic testing of the different alternatives in terms of intervention strategies and mechanisms.

Then, we also explored and analysed the narratives that different policy actors use to make sense and share information about one of Mockus’ emblematic interventions. By doing so, we were able to describe the main themes and anchors, characters, plots, and morals that seem to be important for citizens and the press. Results provide support for the need to take narratives seriously in the design, implementation and analysis of social norm and other behavioural interventions (especially in the areas and with the characteristics we describe). Specifically for Mockus’ interventions, they show how concrete and abstract understandings of the intervention and its goals, appropriate anchors, and collective self-observation processes are essential, and how Mockus leveraged the essence of drama and ritual to foster appropriation and embodiment of these narratives.

And finally, in the third study we showed how social norm interventions based on the Installation Theory framework can be a cost-effective alternative to transform behaviour even when more traditional initiatives are already being undertaken. More specifically for social norms, we also showed how an intervention based on exposure to behaviours and opinions could show marginally

better effects than one based only on indirect group summary information (but that such intervention is also quite effective when people do not have a clear estimate of how their own behaviour compared to the rest of the group). Also, that mixing both variants in a single intervention that has several points of contact is not necessarily more effective in the short or long term. This speaks of the need for both research and practice to carefully consider the three types of local determinants of behaviour that are at play in a specific context (including other interventions), and of adapting interventions to profit from any gaps or opportunities in them.

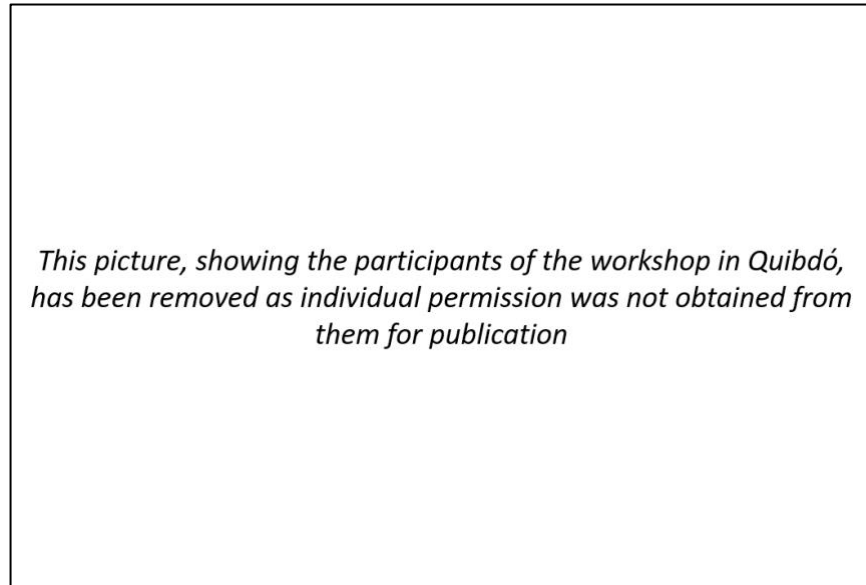
Together, my hope is that all these findings can provide some input, elements of reflection and tools that can inform the effort I described above to produce research that helps practitioners. I personally discovered the potential of the Civic Culture approach and social norm interventions while working as Antanas Mockus' research assistant for around two years. In the 4 years after that, I was able to research and apply these ideas with many public institutions and social collectives in Colombia. Then, through the PhD and my work at ILO, I have been able to engage with policymakers and young local leaders that are working to tackle policy and industry challenges in countries as varied as Colombia, Lithuania, China, Argentina, Cameroon, Lebanon, Bangladesh or Hong Kong. And despite the risk of sounding unoriginal, more than 70 years later and in totally different conditions, my impression is similar to what Lewin (1946) describes.

This was also one of the central topics of discussion in the workshops I did with young local leaders in Quibdó, one of the most vulnerable areas of Colombia. In Quibdó, as in many other contexts, there are very brave people working together to make the world better by tackling urgent social challenges that can be traced to collective trends of behaviour (like domestic violence, exploitative work conditions, deaths in traffic accidents, corruption, and many others). But at the same time, one of the most important challenges they report facing is linked to how most people around them seem to either not recognize these challenges as a problem, or to have lost hope that it could ever be changed. Many, as well, were waiting for structural conditions to radically change, or for someone else to solve the problem (like the State, politicians, "good leaders", or generous businessmen).

But what about ourselves? What about our friends, our neighbours, our family? Are we all to wait passively? How can we change and, more importantly, how can we convince others around us to change? As assassinated Colombian comedian Jaime Garzón said (speaking about Mockus' experience): "if you, young people, don't assume the direction of your own country, nobody is going to come and save you" (Garzón, 1997). This is also Boal's fundamental message: the theatre and the poetics of the oppressed is about spectators no longer delegating to others the power "to

act and think in their place”, it is about spect-actors that now “think and act” for themselves (Boal, 2009, p. 64).

Image 3. A workshop to design social-norm interventions in Quibdó, Colombia

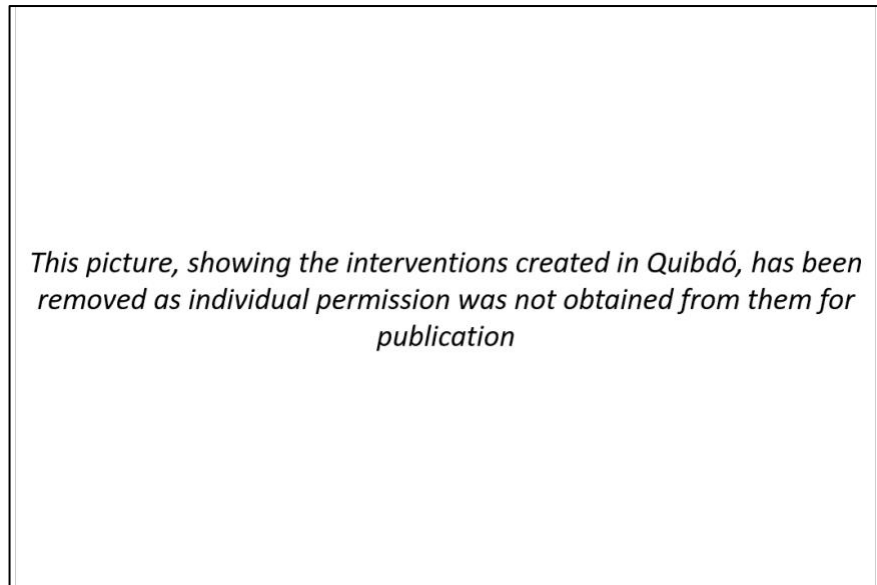


Social norm interventions are not a panacea. I do not think that anyone can say with complete certainty that social norms are better or worse than the over 130 other theories I identified in Section 2.1.1. Indeed, many actors in these contexts did very effective and valuable work before, after, or instead of engaging with social norms. They are rather an additional resource, but one that had the great advantage of creating a sense of shared reflection and shared responsibility on both the problem and their solutions, while at the same time offering concrete, fun and inexpensive ways to change local realities through social interaction. Social norms are worth exploring and testing further, because they can create collective understandings and collective action around common problems, and they can (sometimes) make a difference in people’s lives.

That is why I decided to undertake a PhD to explore behavioural change interventions based on social norms. That is also why I have chosen research and intervention contexts in Colombia, and why including co-authors that are currently working as practitioners around these issues is important to me: maybe, and that is my ultimate personal goal in this project, we can contribute together with our participants and other interested actors to dissipate a little bit of this particular fog. Which in this case, is linked to the idea that we don’t have to wait for the State to develop costly regulatory changes or to decide to finally enforce existing regulations, and we don’t have to wait for a lengthy change in educational practices or values (although as already mentioned, all those and other things are always important and welcomed). And that, especially when a social problem can be traced in part to how a group conceptualizes problematic behaviours as typical and/or acceptable (Tankard & Paluck, 2016), taking direct collective action to show that not all of

us believe that those behaviours should be typical or desirable, and that more and more people agree with that and are willing to act to change it, can have impressive effects.

Image 4. One of the interventions designed in the workshop



As I mentioned at the beginning, the COVID-19 crisis has shown in a scale that few others have, how our most everyday behaviours can have an impact on both the people around us and the rest of the world, and how behavioural changes are sometimes essential to improve our collective wellbeing and our chances of survival. But actually, in every corner of the world we can find challenges for which this is also true. One of the many things that the young leaders in Quibdó taught me (again and again, pre and post COVID-19) is that we cannot keep waiting indefinitely for the people on top, the great leaders, the big institutions, or the big experts (including the behavioural science experts), to decide to change or to make things better. That it is also up to us, disseminated ordinary heroes (de Certeau & Wittgenstein, 1978, p. 3), and that we need and we can act together. That as Rappaport (1995, p. 805) wrote, “some stories empower people and other stories disempower people”. And that research, in the end, is also about that.

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Annexes

For the framing materials

- 1. Theoretical concepts to classify models and theories of behaviour and behavioural change**
- 2. Main elements in applied models of behavioural change**
- 3. Research ethics reviews from the London School of Economics and Political Science and the Department of Psychological and Behavioural Science**
- 4. Data Management Plan for the project**

For Study 1: A systematic review of behavioural change interventions based on social norms

- 5. Systematic review research protocol and codebook (Study 1)**
- 6. Complete list of coded studies (Study 1)**
- 7. Multiple Correspondence Analysis output and coordinate plot (Study 1)**

For Study 2: A qualitative study to analyse the narratives that key policy actors share about Mockus' interventions

- 8. Citizen questionnaire (Study 2)**
- 9. Sample press, citizen and designer narratives (Study 2)**
- 10. Basic statistics and characteristic words and phrases for Thematic Classes (Study 2)**
- 11. Multiple Correspondence Analysis output and coordinate plots (Study 2)**
- 12. Narrative Policy Framework codebook (Study 2)**

For Study 3: A field experiment to test the effects of a social norm intervention based on the Installation Theory framework

- 13. Subjective Evidence-Based Ethnography ethics note (Study 3)**
- 14. Sample driver replay-interview data (Study 3)**
- 15. Copies of intervention mechanisms used (Study 3)**
- 16. Experimental data summary table (Study 3)**
- 17. Experimental data distribution for Driving Parameter Alerts (DPAs) (Study 3)**

Annexes

Annex 1. Theoretical concepts to classify models and theories of behaviour and behavioural change

List of identified theories and models

No.	Theory or model (1)	Reference (2)	Review (3)					
			Darnton (2008b)	Davis et al. (2015)	Michie et al. (2014)	Brennan et al. (2014)	Donovan (2011)	Cultural Change Team
1	Action Model of Consumption	(Bagozzi, 2000)	X	X	X			
2	Affective Events Theory	(Weiss & Cropanzano, 1996)		X	X			
3	AIDS Risk Reduction Model	(Catania, Kegeles, & Coates, 1990)		X	X			
4	Applied Behaviour Analysis Framework	(Geller, 1989)					X	
5	Attitude, Social Influence and Self-Efficacy Model and its successor I - Change Model	(Vries, Mesters, Steeg, & Honing, 2005)		X	X			
6	Awareness Interest Decision Action (AIDA)	(Kotler, 1999)	X					X
7	Barriers and Facilitators Model for Retailing Condoms	(Nguyen, Parker, Brennan, & Clements, 2014)				X		
8	Behavioural Ecological Model of AIDS Prevention	(Hovell et al., 1994)		X				
9	Bounded rationality	(Simon, 1967)	X					
10	CEOS Theory	(Borland, 2016)			X			
11	Change Theory	(Lewin, 1947b)	X	X	X			X
12	Citizen Culture	(Mockus, 2002)						X
13	Classical Conditioning	(Pavlov, 1927)		X	X			
14	Collective Intelligence Model	(Smith, 1994)				X		
15	Cognitive Dissonance Theory	(Festinger, 1962)					X	
16	COM-B Model	(Michie et al., 2011)		X	X	X		
17	Comprehensive Model of Behavioural Change	(Bagozzi, 2002)				X		
18	Consumer Socialization Agency	(Watne & Brennan, 2011)				X		
19	Consumer Socialization Theory	(Moschis & Churchill, 1978)				X		
20	Consumption as a Social Practice Theory	(Spaargaren, 2011)	X	X	X			
21	Containment Theory	(Reckless & Diniz, 1972)		X	X			
22	Control Theory	(Carver & Scheier, 1982)	X	X	X			

No.	Theory or model (1)	Reference (2)	Review (3)					
			Darnton (2008b)	Davis et al. (2015)	Michie et al. (2014)	Brennan et al. (2014)	Donovan (2011)	Cultural Change Team
23	Corporate Social Marketing	(Inoue & Kent, 2014)				X		
24	Cultural capital and cultural change model	(Sánchez & Guerrero, 2015)						X
25	Differential Association Theory	(Bruinsma, 1992; Sutherland, 1956)		X	X			
26	Diffusion of Innovations Theory	(Rogers, 2003)	X	X	X		X	X
27	Double Loop Learning	(Argyris, 1982)	X					
28	Ecological Model of Diabetes Prevention	(Burnet, Plaut, Courtney, & Chin, 2002)		X	X			
29	Education for Sustainable Development 1 / Education for Sustainable Development 2 (ESD1/ESD2)	(Vare & Scott, 2007)	X					
30	Elaboration Likelihood Model of Persuasion	(Kitchen et al., 2014)	X			X		
31	Environmantal Education Strategies Framework	(Monroe et al., 2015)	X					
32	Expectancy Value Theory	(Wigfield & Eccles, 2000)	X					
33	Extended Information Processing Model	(Flay, DiTecco, & Schlegel, 1980)		X	X			
34	Extended Parallel Process Model	(Witte, 1992)		X	X			
35	Fear Appeals Theory	(Hovland et al., 1953)	X					
36	Feedback Intervention Theory	(Kluger & DeNisi, 1996)		X	X			
37	Focus Theory of Normative Conduct	(Cialdini et al., 1990)	X	X	X	X		X
38	General Theory of Crime	(Gottfredson, 1990)		X	X			
39	General Theory of Deviant Behaviour	(Kaplan & Lin, 2005)		X	X			
40	Goal Directed Theory	(Bagozzi, 1992)		X	X			
41	Goal Framing Theory	(Lindenberg & Steg, 2007)		X	X			
42	Goal Setting Theory	(Locke & Latham, 2002)		X	X			
43	Health Action Process Approach	(Schwarzer, 1992)		X	X			
44	Health Behaviour Goal Model	(Gebhardt & Maes, 2001)		X	X			

No.	Theory or model (1)	Reference (2)	Review (3)					
			Darnton (2008b)	Davis et al. (2015)	Michie et al. (2014)	Brennan et al. (2014)	Donovan (2011)	Cultural Change Team
45	Health Behaviour Internalisation Model	(Bellg, 2003)		X	X			
46	Health Belief Model	(Rosenstock, 2005)	X	X	X	X	X	
47	Health Promotion Model	(Pender, Murdaugh, & Parsons, 2005)		X				
48	Hierarchy of Effects Model - Lavidge and Steiner	(Lavidge & Steiner, 1961)				X		
49	Hierarchy of Effects Model - McGuire	(McGuire, 1984)				X		
50	Hierarchy of Effects Model - National Public Health Partnership	(Bauman, Bellew, Vita, Brown, & Owen, 2002)				X		
51	Hierarchy of Emotional Affects	(Laros & Steenkamp, 2005)				X		
52	Implementation Intentions Model	(Wieber et al., 2015)	X					
53	Information-Motivation-Behavioural (IMB) Skills Model and its extension relating adherence	(Fisher, Amico, Fisher, & Harman, 2008; Fisher et al., 2002)	X	X	X	X		
54	Installation Theory	(Lahlou, 2015)						X
55	Integrated Theoretical Model for Alcohol and Drug Prevention	(Gonzalez, 1989)		X	X			
56	Integrated Theory of Drinking Behaviour	(Wagenaar & Perry, 1994)		X	X			
57	Integrated Theory of Health Behaviour Change	(P. Ryan, 2009)		X	X			
58	Integrative Model of Behavioural Prediction	(Fishbein, 2000)		X	X			
59	Integrative model of factors influencing smoking behaviour	(Flay, D'Avernas, Best, Kershell, & Ryan, 1983)		X	X			
60	Integrative Model of Factors Influencing Smoking And Attitude And Health Behaviour Change	(Flay, D'Avernas, Best, Kershell, & Ryan, 1983)			X			
61	Integrative model of health attitude and behaviour change	(Flay, D'Avernas, Best, Kershell, & Ryan, 1983)		X	X			
62	Interpersonal Behaviour Theory	(Triandis, 1977)	X	X	X	X	X	
63	Judgement Heuristics	(Tversky & Kahneman, 1974)	X					
64	Main Determinants of Health Model	(Dahlgren & Whitehead, 2006)	X			X		
65	Mastery Modelling	(Bandura, 1978)	X					
66	MODE model	(Ewoldsen et al., 2015)	X			X		

No.	Theory or model (1)	Reference (2)	Review (3)					
			Darnton (2008b)	Davis et al. (2015)	Michie et al. (2014)	Brennan et al. (2014)	Donovan (2011)	Cultural Change Team
67	Motivation Opportunity Abilities Model	(Olander & Thøgersen, 1995)		X	X	X		
68	Needs Opportunities Abilities (NOA) Model	(Steg & Vlek, 2009)	X	X	X	X		
69	Nine Ps Model of Organizational Sustainability	(Linda Brennan & Binney, 2011)				X		
70	Norm Activation Theory	(Schwartz & Fleishman, 1978)	X	X	X	X		X
71	Norm Neutralization Theory	(Sykes & Matza, 1957)	X					
72	Normative Social Behaviour Theory	(Rimal et al., 2005)	X	X	X	X		
73	Nudging	(Thaler & Sunstein, 2008)						X
74	Obesity System Map	(Butland et al., 2007)	X					
75	Operant Learning Theory	(Skinner, 1953)		X	X			
76	Organizational Culture	(Schein, 1992)	X					
77	Planned Behaviour Theory (TPB)	(Ajzen, 1991)	X	X	X	X	X	
78	Positive Psychology Theory	(Seligman & Csikszentmihalyi, 2000)				X		
79	Precaution Adoption Process Model	(Weinstein, Lyon, Sandman, & Cuite, 1998)		X	X	X		
80	Pressure System Model	(Katz, 2001)		X	X			
81	PRIME Theory	(West, 2013)		X	X			
82	Pro-environmental Behaviour Model	(Kollmuss & Agyeman, 2002)	X	X	X	X		
83	Problem Behaviour Theory	(Jessor, 1987)		X	X			
84	Prospect Theory	(Kahneman & Tversky, 1979)	X	X	X	X		
85	Protection Motivation Theory	(Rogers, 1975)	X	X	X	X	X	
86	Prototype Willingness Model	(Gerrard et al., 2008)	X	X	X	X		
87	Rational Addiction Model	(Becker & Murphy, 1988)		X	X			
88	Reasoned Action Theory (TRA)	(Fishbein & Ajzen, 1975)	X	X	X		X	

No.	Theory or model (1)	Reference (2)	Review (3)					
			Darnton (2008b)	Davis et al. (2015)	Michie et al. (2014)	Brennan et al. (2014)	Donovan (2011)	Cultural Change Team
89	Reflective Impulsive Model/Dual Process Theory	(Strack & Deutsch, 2004)		X	X			
90	Regulatory Fit Theory	(Higgins, 2000)		X	X			
91	Relapse Prevention Model	(Marlatt & George, 1984)		X	X			
92	Risks as Feelings Theory	(Loewenstein et al., 2001)	X	X	X	X		
93	Schematic Causal Model of Environmental Concern	(Stern et al., 1995)	X					
94	Self-categorization Theory	(Turner, 1987)	X					
95	Self-determination Theory	(Deci, 1985)		X	X	X		
96	Self-efficacy Theory	(Bandura, 1978)	X	X	X		X	
97	Self-regulation Theory	(Kanfer & Goldstein, 1991)			X			
98	Seven Doors to Social Change Model	(Robinson, 2012)				X		
99	Six Staged Model of Communication Effects	(Vaughan & Rogers, 2000)		X	X			
100	Social Action Theory (1)	(Weber, 1968)		X	X			
101	Social Action Theory (2)	(Ewart, 1991)		X	X			
102	Social Behaviour Influence Model	(Lafreniere & Deshpande, 2013)				X		
103	Social Capital	(McMichael & Shipworth, 2013; Putnam, 2000)	X					
104	Social Change Theory	(Thompson & Kinne, 1990)		X	X			
105	Social Change Model for Leadership Development	(Komives & Wagner, 2009)				X		
106	Social Cognitive Theory of self-regulation	(Bandura, 1991)	X	X	X		X	
107	Social Consensus Model of Health Education	(Romer & Hornik, 1992)		X	X			
108	Social Development Model	(Hawkins & Weis, 1985)		X	X			
109	Social Ecological Model of Behaviour Change	(Panter-Brick, Clarke, Lomas, Pinder, & Lindsay, 2006)		X	X		X	
110	Social Ecological Model of Walking	(Alfonzo, 2005)		X	X			

No.	Theory or model (1)	Reference (2)	Review (3)					
			Darnton (2008b)	Davis et al. (2015)	Michie et al. (2014)	Brennan et al. (2014)	Donovan (2011)	Cultural Change Team
111	Social Entrepreneurship Bounded Model	(Weerawardena & Sullivan Mort, 2006)				X		
112	Social Identity Theory	(Tajfel & Turner, 1979)	X	X	X	X		
113	Social Influence Model of Consumer Participation	(Dholakia, Bagozzi, & Pearo, 2004)		X	X			
114	Social Innovation Spiral	(Murray, Caulier-Grice, & Mulgan, 2010)				X		
115	Social Learning Theory	(Dollard & Miller, 1967)		X	X			
116	Social Norms Theory	(Perkins & Berkowitz, 1986)		X	X			
117	Social Practice Theory	(Hand, Shove, & Southerton, 2005)				X		
118	Social-Psychological Interventions (or movie-like or narrative edits	(Brummelman & Walton, 2015; Kenthirarajah & Walton, 2015; Walton &						X
119	Stages of Change for Public Opinion	(Bogart et al., 2016)					X	
120	Structuration Theory	(Giddens, 1984)	X					
121	System 1 / System 2 Cognition	(Stanovich & West, 2000)	X					
122	Systems Model of Health Behaviour Change	(Kersell & Milsum, 1985)		X	X			
123	Systems Thinking	(Kim & Senge, 1994; Senge, 2006)	X					
124	Targeting Outcomes of Programmes (TOP) Model	(Rockwell & Bennet, 2004)				X		
125	Technology Acceptance Models 1, 2 and 3	(Venkatesh & Bala, 2008)		X	X			
126	Temporal Self-regulation Theory	(Hall & Fong, 2015)		X	X			
127	Terror Management Health Model	(Goldenberg & Arndt, 2008)		X	X			
128	Terror Management Theory	(Greenberg, Pyszczynski, & Solomon, 1986)		X	X			
129	Theatre of the Oppressed Framework	(Boal, 2000)						X
130	Transcontextual Model of Motivation	(Hagger et al., 2009)		X	X			
131	Transtheoretical Model of Behavioural Change	(Prochaska et al., 2008)	X	X	X	X	X	
132	Triadic Influence Theory	(Flay & Petraitis, 1994)		X	X			

No.	Theory or model (1)	Reference (2)	Review (3)					
			Darnton (2008b)	Davis et al. (2015)	Michie et al. (2014)	Brennan et al. (2014)	Donovan (2011)	Cultural Change Team
133	Tripartite Model	(Snitow & Brennan, 2009)				X		
134	Trying Theory	(Bagozzi, 2002; Bagozzi & Warshaw, 1990)					X	
135	U Theory	(Scharmer, 2009)	X			X		
136	Value-Action Gap Model	(Blake, 1999)	X			X		X
137	Values Beliefs Norms Theory	(Stern et al., 1999)	X	X	X	X		
138	Wheel of wellness	(Myers, Sweeney, & Witmer, 2000)				X		
TOTALS			48	80	81	46	14	12

Review of theoretical concepts to classify models and theories of behaviour and behavioural change

This Annex presents a short explanation of some of the main theoretical concepts that underlie some of the theories and models identified in Annex 1. These have been adapted from Darnton (2008a), and include:

Theoretical concepts to classify the theories and models identified³⁰

1. Theories of behaviour	2. Theories of behavioural change
A. Attitudes, values and beliefs	J. Change through habits
B. Social and personal norms	K. Change through social norms
C. Economic assumptions and behavioural economics	L. Change through social networks
D. Information deficit models	M. Change through learning
E. Self-efficacy and control	N. Change through narrative edits
F. Self-regulation	O. Change through choice architecture
G. Habits and routines	P. Change through systems
H. Emotions	
I. Contextual and societal factors	

Of course, these categories have been defined for explanatory and analytical purposes, as often the theories identified are based on several of these concepts.

1. Theories of behaviour

A. Attitudes, values and beliefs

The study of attitudes and its relation to behaviour is central to social psychology (Glasman & Albarracín, 2006). Attitudes are broadly defined as “the learned, relatively stable tendency to respond to people, concepts, and events in an evaluative way” (Gerrig & Zimbardo, 2010). The extent to which attitudes are indeed relevant to determine behaviour is contested (Glasman & Albarracín, 2006). While some research has shown how attitudes can have little or no influence on a lot of behaviours (Ajzen & Fishbein, 1980; Kollmuss & Agyeman, 2002; Webb & Sheeran, 2006), others have produced evidence showing that certain factors (such as how stable, accessible or related to affect is a specific attitude) are related to a behaviour being highly predictable by a certain attitude (Glasman & Albarracín, 2006; Lawton et al., 2009).

³⁰ Following Darnton (2008c), a distinction is made between *theories of behaviour*, that aim to explain why behaviour happens (or does not happen) and the factors that influence it, and *theories of behavioural change*, that explain why and how behaviours change (or not change). In addition to them, *applied models and techniques of change*, which define clear procedures and indications to create behavioural change interventions (called *methods of practice* in Brennan, Binney, Parker, Aleti, & Nguyen, 2014), are also distinguished.

Models and theories based on attitudes, values and beliefs include the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and its development, the Theory of Planned Behaviour (TPB) (Ajzen, 1991), the Health Belief Model (Rosenstock, 2005), the Protection Motivation Theory (Rogers, 1975), the Schematic Causal Model of Environmental Concern and the Values Beliefs Norms Theory (P. Stern et al., 1995, 1999), the Value Action Gap (Blake, 1999), the Theory of Trying (Bagozzi, 2002; Bagozzi & Warshaw, 1990), the Elaboration Likelihood Model (Kitchen et al., 2014) and the MODE model (Ewoldsen et al., 2015).

B. Social and personal norms

Social norms is another topic that has been central to social psychological research for a long time (i.e. Allport, 1924; Asch, 1952, 1955; Sherif, 1936). Defined broadly as the rules that describe what a certain reference group considers to be typical or desirable behaviour in a certain situation, social norms define our membership to a group, how we perceive social situations and how we interact with other (Sherif, 1965). Additionally, to account for the norms that have already been internalized and respond not to social but to personal expectations (like a sense of moral obligation and alignment with self-concepts), Schwartz (Schwartz & Fleishman, 1978) has proposed the concept of personal norms. Just as with attitudes, the relationship between social and personal norms and behaviour is also contested. Here also, while some authors have criticised the concept for being too general and contradictory (R. B. Cialdini et al., 1990), there is a growing literature in social psychology that have proposed refinements of the concept of social norms and produced compelling empirical evidence of a strong but qualified link between trends of behaviour and social norms (Bicchieri, 2006; Cialdini et al., 1990; Elster, 1989; Kenny & Hastings, 2011; Mackie et al., 2012; Mockus et al., 2012; Paluck & Shepherd, 2012; Pool & Schwegler, 2007; Tankard & Paluck, 2016).

Some models and theories of behaviour that rely on social and personal norm include once again the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991), Focus Theory of Normative Conduct (R. B. Cialdini et al., 1990), the theory of normative social behaviour (Rimal et al., 2005), the Social Identity Theory (Tajfel & Turner, 1979; Terry et al., 2000), the Self Categorization Theory (J. C. Turner, 1987) and the Norm Activation Theory (Schwartz & Fleishman, 1978).

C. Economic assumptions and behavioural economics

Models of behaviour based on standard economic theory “present behaviour as the product of a deliberative process (based on intention and expected outcomes)” (Darnton, 2008b, p. 11). Because of this, they are also known as Expected Utility Models (Darnton, 2008c). Although rational choice processes have been shown to be limited (Simon, 1967), this approach has been successful in predicting and transforming behavioural outcomes in a wide range of situations, especially those where some kind of active or passive choice is required (Sunstein, 2016). Behavioural economics has further explored how people often behave in ways that do not correspond with perfect rationality (Darnton, 2008c). Instead of carefully considering every choice available and its consequences, people often “rely on a limited number of heuristic principles which reduce the

complex tasks of assessing probabilities and predicting values to simpler judgmental operations” (Tversky & Kahneman, 1974, p. 1124).

Some of the theories and models based on these ideas include Bounded Rationality (Simon, 1967), Prospect Theory (Kahneman & Tversky, 1979) and System 1/System 2 Cognition (Stanovich & West, 2000).

D. Information deficit models

Another type of model of behaviour are those that are based on the importance of information in forming knowledge, attitudes, and ultimately behaviour (Darnton, 2008a; see Kollmuss & Agyeman, 2002). While this perspective is useful because information and knowledge are important components of certain behaviours, different lines of research have shown how information is not enough in itself to produce or change most behaviours (Darnton, 2008c; Kollmuss & Agyeman, 2002; Lawton et al., 2009). Models and theories based on information deficit include the Awareness Interest Decision Action model (Kotler, 1999) and the aforementioned Value Action Gap (Blake, 1999).

E. Self-efficacy and control

The general concepts of personal agency and self-efficacy, the belief that we can perform a certain action and that the action will bring an expected outcome, is also a common element in a lot of behavioural models (Darnton, 2008c). Theories and models based on these concepts include the Theory of Planned Behaviour (TPB) (Ajzen, 1991), the Theory of Fear Appeals (Hovland et al., 1953), the Theory of Self-Efficacy (Bandura, 1978), the Protection Motivation Theory (Rogers, 1975). Control understood as a limit to self-efficacy has also been explored in the Model of Pro-Environmental Behaviour (Kollmuss & Agyeman, 2002).

F. Self-regulation

Other behavioural models in social psychology are based in our capacity to continuously adjust our behaviour according to the feedback we directly or indirectly receive using self-regulation. Theories and Models that use this concept of behaviour as an ongoing process of self-regulation include Control Theory (Carver & Scheier, 1982) and the Cognitive Theory of Self-Regulation (Bandura, 1991).

G. Habits and routine

Some behavioural models have also highlighted the role of habit and routine in shaping behaviour, thus introducing a stronger emphasis in the temporal dimension to the analysis of behaviour and behavioural change. These include Theory of Interpersonal Behaviour (Triandis, 1977), the Prototype/Willingness Model (Gerrard et al., 2008) and the Transtheoretical Model of Health Behaviour (Prochaska et al., 2008), known also as the Stages of Change Model (Darnton, 2008c; Velicer & Prochaska, 2008).

H. Emotions

Emotion, broadly defined as “a pattern of changes, including physiological arousal, feelings, cognitive processes, and behavioural reactions, made in response to a situation perceived to be personally significant” (Gerrig & Zimbardo, 2010), is another important element of behavioural models. These include the Risk as Feelings Model (Loewenstein et al., 2001), the Elaboration Likelihood Model of Persuasion (Kitchen et al., 2014), the Model of Pro-Environmental Behaviour (Kollmuss & Agyeman, 2002) and the Norm Activation Theory (Schwartz & Fleishman, 1978).

I. Contextual and societal factors

While most theories included in this review focus on how behaviour is determined by factors that are “internal” to individuals (Darnton, 2008c), there are other models that focus on how broader societal factors and specific contexts also have a great influence on behaviour and cognition. These frameworks have the great advantage of incorporating into their analysis the broader factors that influence behaviour and that explain broader trends of behaviour, a perspective that must be taken into account to achieve sustainable changes in behaviour that goes beyond a set of individuals. These theories explore “behaviour as a social practice based on interactions between ourselves and the world, which both provide for and constrain our behaviour, and through which we create both the external world and our self-identity” (Darnton, 2008c).

Models and theories that include this perspective include Installation Theory (Lahlou, 2015, 2017), the Theory of Interpersonal Behaviour (Triandis, 1977), the Theory of Planned Behaviour (Ajzen, 1991), Structuration Theory (Giddens, 1984), the Needs Opportunities Abilities (Steg & Vlek, 2009), the Theory of Consumption as Social Practices (Spaargaren, 2011), the Social Ecology Theory (Stokols, 1996) and the Main Determinants of Health Model (Dahlgren & Whitehead, 2006).

2. Theories of change

Although all the theories of behaviour just reviewed include the possibility of transforming behaviours by influencing one or several of the factors that explain it, there are some theories that have focused specifically on explaining behavioural change. Kurt Lewin’s (1947a, 1947b) Field Theory and the unfreezing/moving/refreezing change process has been widely influential in theories of behaviour and behavioural change, both within social psychology and within other disciplines. Most of those referenced a comprehensive review like Darnton’s (2008c) are based in compatible ideas. For Lewin (1947a, 1947b), equilibriums of the forces that maintain group standards can be changed sustainably by unfreezing the current situation before undertaking a change and freezing the new one after doing it. In order for this change to be effective, a certain level of collective learning and group decision must be undertaken (as opposed to simply passing on information) (Lewin, 1947a, 1947b).

J. Change through habits

As conceptualized by Lewin (1947a, 1947b), habits are both barriers to change and what guarantees their sustainability, an idea that is explored by several change theories. Different theories and models have explored the formation, maintenance and abandonment of habits,

including the Prototype/Willingness Model (Gerrard et al., 2008), the Mastery Modelling technique (Bandura, 1978) and the Implementation Intentions framework (Wieber et al., 2015).

K. Change through social norms

Research in social psychology has explored for several years the power of social norms to transform behaviour (Miller & Prentice, 2016; Tankard & Paluck, 2016). These frameworks and trends of research have shown that social norms can be effective to generate changes in collective trends of behaviour even in real-world settings and even in very large groups, covering issues such as littering (R. B. Cialdini et al., 1990), towel reuse in hotels (Goldstein et al., 2008), recycling (Tankard & Paluck, 2016), gender based violence (Paluck & Ball, 2010), harassment (Paluck & Shepherd, 2012), intergroup prejudice (Paluck, 2009), theft (Cialdini et al., 2006), open defecation and female mutilation (Mackie et al., 2015), footbinding (Mackie, 1996), drinking and drug use (Miller & Prentice, 2016).

Miller and Prentice (Miller & Prentice, 2016) have highlighted three kinds of strategies that use social norms for behavioural change: Social Norms Marketing, Personalized Normative Feedback and Focus Group Discussion. The *Citizen Culture* (Tognato, 2017) approach, based on mutual regulation and social norms, has been developed by Mockus (2002) and applied extensively to coexistence problems (Mockus et al., 2012; Sánchez, 2012; Sommer, 2006, p. 2; Tognato, 2017; Yamin, 2012, 2013).

L. Change Through Social Networks

Rather than exploring how to begin change, some models highlight how behavioural changes are disseminated and sustained through large groups, conceptualized as networks. These include Social Capital (McMichael & Shipworth, 2013; Putnam, 2000), the Diffusion of Innovations Model (Rogers, 2003) and the Stages of Change in Public Opinion (Bogart et al., 2016). In a related perspective, Valente and Pumpuang (2007) have identified some of the techniques that have been used to identify different types of opinion leaders to promote and scale behavioural change.

M. Change through learning

An important element of many theories of behaviour and change is learning, be it in the form of the acquisition of new information or skills, of our previous experiences, or the continuous feedback we get when behaving in a certain way or trying to change something (Darnton, 2008c). Models and theories and emphasise learning as a means of change include the Double Loop of Learning (Argyris, 1982), ESD1/ESD2 theory (ESD stands for Education for Sustainable Development) (Vare & Scott, 2007), the Information-Motivation-Behaviour Skills Model (Fisher et al., 2002), the Framework for Environmental Education (Monroe et al., 2015), the Implementation Intentions Model (Wieber et al., 2015), the Theatre of the Oppressed framework (Boal, 2009) and the Applied Behaviour Analysis framework (Geller, 1989).

N. Change through narrative edits

Inspired by Lewin's (1947a, 1947b) interventions based on a collective discussion of new narratives that lead to a collective decision, some researchers in social psychology have started to explore the potential of "redirecting the narratives that people have about themselves and the social world in a way that leads to lasting changes of behaviour" (Wilson, 2011). These "story editing" (Wilson, 2011), "movie interventions" (Kentthirarajah & Walton, 2015) or "social-psychological interventions" (Brummelman & Walton, 2015; Walton, 2014; Yeager & Walton, 2011), distinguish themselves from nudge interventions that only target a particular decision and rather influence "core beliefs or other aspects of the self and thus people's behaviour as it unfolds over time in diverse settings" (Kentthirarajah & Walton, 2015). Research using this approach has found surprising and sustainable effectiveness of this approach in domains such as social belonging and value-affirmation in college, theories of intelligence and stereotypes in middle school, satisfaction and third person perspective taking in marriage, enhanced self-esteem and reduction of medical errors (Kentthirarajah & Walton, 2015; Walton, 2014; Walton & Dweck, 2009; Yeager & Walton, 2011).

O. Change through choice architecture

Choice architecture uses the findings of behavioural economics to influence the decisions that people make in real world contexts (an approach frequently referred to as *nudging*). Unlike other theories reviewed in this section, the nudging approach does not focus on influencing behaviour, but rather "choice in a way that will make choosers better off, as judged by themselves" (Thaler & Sunstein, 2008, p. 5). This "libertarian paternalism", as defined by them, targets the rates in which people choose different options, and not necessarily each individual decision.

Sunstein (Sunstein, 2016) has recently identified 31 types of nudges that have been applied to a wide variety of problems, including savings, energy and environmental conservation, healthcare, consumer rights, tax paying, nutrition, form filling, finances and school meals (see Levitt, 2006; Sunstein, 2016; Thaler & Sunstein, 2008 for details and further practical examples). He has also described how the use of default rules, active choosing, simplification, social norms, disclosure and cognitive accessibility have played a very important role in achieving large scale behavioural changes, especially when informing policy objectives.

P. Change through systems

For some theories and models of change, to understand change it is not enough to analyse detached factors, but rather the whole system that supports the current situation and its possibilities for transformation. Indeed, while most behavioural change interventions assume that changing the individual behaviour of a certain number of people automatically brings social change, this is not always the case and there is little research on the relationship between these two levels (Tankard & Paluck, 2016). Approaches based on systems include Systems Thinking (Kim & Senge, 1994; Senge, 2006), the Obesity System Map (Butland et al., 2007), Theory U (Scharmer, 2009) and Installation Theory (Lahlou, 2015, 2017). This idea is of course compatible with Lewin's (K. Lewin, 1947a, 1947b) force fields, but its developments have focused on behaviour driven by feedback loops rather than by group standards.

Annex 2. Main elements in applied models of behavioural change

The following review, first produced for the Framing and Upgrade Materials of this project and then updated several times, was then included in the “Practical methods to change social norms in domestic work” report by the International Labour Organization (Yamin & Hobden, n.d.). As such, it was written by Paulius Yamin but received editorial help and feedback from Claire Hobden. The most recent version is included here as reference.

A variety of applied models of behavioural change have been developed and documented (For a review of the 14 most widely used models, see Brennan et al., 2014; Darnton, 2008a). While these differ from one another in some ways, it is possible to identify some of their critical steps and tools. These elements are not restricted to social norms interventions, but inform a wider range of behavioural and other change interventions. And although some of these steps and tools seem obvious, very few social norm interventions seem to take advantage of them. For clarity purposes, the steps have been divided into the three successive stages that are generally followed in policy interventions: diagnostic, design, implementation, and evaluation. An additional title called “transversal” identifies those actions that should be performed during the whole process³¹. In general, all interventions should be designed on the basis of a strong literature review that identifies the relevant theories, previous research and practical experiences, makes explicit the models of behaviour and behavioural change that support the intervention, gathers previous experiences and research on the topic, and that situates the intervention within existing or future policy frameworks (9P - Darnton, 2008a).

Diagnostic

- Many models emphasise the process of **identifying and prioritizing the specific behaviours to be targeted in the intervention**. This includes going from a general problem or target sector to choosing specific, relevant and impactful behaviours (CBSM - Chaudhary & Warner, 2015; McKenzie-Mohr, 2011, p. 1), as well as breaking complex behaviours into smaller components in order to target them more effectively (9P - Darnton, 2008a).
- Most models include some form of **diagnostics of the contexts, the groups and the behaviours that will be targeted** in the intervention. This can be done before, during or after prioritizing the target behaviours for the intervention. The scope, tools and

³¹ The models and abbreviations used are: Communication for Development –**C4D** (UNICEF, 2016); Community-Based Prevention Marketing –**CBPM** (Bryant et al., 2000); Community-Based Social Marketing –**CBSM** (Chaudhary & Warner, 2015; McKenzie-Mohr, 2011, p. 1); Community Readiness Model –**CRM** (Kelly et al., 2003); Cultural Capital Framework –**CCF** (Knott et al., 2008); DEFRA’s 4Es Model –**4E** (Eppel et al., 2013); EAST Framework to Apply Behavioural Change Insights –**EAST** (Service et al., 2014); Eight Step Process for Leading Change –**8S** (Kotter, 2011, p. 2); Intervention Mapping Model –**IM** (Kok, 2014); Nine Principles for Developing Behavioural Change Interventions –**9P** (Darnton, 2008b); Principles for Intervening to Change Environmentally Destructive Behaviour –**CEDB** (P. C. Stern, 2000); Six-Stage Model of Social Marketing –**MSM** (Andreasen, 2011); Social Norms and Change Technique –**SNCT** (UNFPA-UNICEF, 2016); and System Failure –**SF** (Chapman, 2004, p. 34).

measurements used vary greatly for each model, but they normally seek to capture the characteristics and needs of the community or group (CBPM - Bryant, Forthofer, Brown, Landis, & McDermott, 2000; and IM - Kok, 2014), of the audiences (9P - Darnton, 2008a) and behaviours targeted (as in the exploration of influencing factors in 9P - Darnton, 2008a, or barriers and benefits on CBSM - Chaudhary & Warner, 2015; McKenzie-Mohr, 2011, p. 1), as well as the situations from the actor's perspective (CEDB - Stern, 2000) and the systems that support behaviour with their respective problems (SF - Chapman, 2004, p. 34). Identifying reliable measures not only informs the understanding of intervention contexts, but is also essential to assess its outcomes and impact (see below).

- The need to **identify and use theories, previous research and practical experiences** is also underlined. This includes making explicit the models of behaviour and behavioural change that support the intervention, gathering previous experiences and research on the topic, and articulating the intervention with existing or future policy frameworks and assessment tools (9P - Darnton, 2008a).

Design

- When discussing the process of designing interventions and the basic characteristics they should have to be successful, many models focus on intervening the informational, social and contextual factors around behaviours in order to transform them (4E - Eppel, Sharp, & Davies, 2013; CRM - Kelly et al., 2003; CCF - Knott, Muers, & Aldridge, 2008; and EAST - Service et al., 2014). These include general topics such as the need to define clear materials and protocols from the beginning of the intervention (IM - Kok, 2014), using multiple intervention types that address the different factors of behaviours (CEDB - Stern, 2000), and assuring that interventions are easily understood, attractive, timely and based on social dynamics (EAST - Service et al., 2014).

Also, in contexts where the target population is composed of several demographic groups (i.e. location, gender, socioeconomic status), conduct a marketing segmentation of participants to account for the differences in the perceptions of norms they each might have (Dietrich et al., 2015; Dolcini et al., 2013). This can be done by identifying, diagnosing and targeting these groups with different mechanisms and messages in interventions. The issues of how it is necessary to check if there is some consensus (declared or implicit) for the need to change and to create it if not present before applying an intervention (Prentice & Miller, 1993), how the research methods applied before interventions affect behaviour (Rocci, 2009), and how the effects of individual level interventions or those that are applied on a single occasion quickly decay (Henry, 2010b; Henson, Pearson, & Carey, 2015) have also been discussed.

Implementation

- Many models emphasise the need to **undertake pilots and pre-tests**, as the results of these help to adjust the intervention for efficacy (MSM - Andreassen, 2011; CBSM - Chaudhary & Warner, 2015; 9P - Darnton, 2008a; and IM - Kok, 2014).

- **They also recommend creating short term or early wins** to generate approval, awareness and advocacy around the intervention from both stakeholders and participants, as well as building from those successes to expand impacts (SF - Chapman, 2004, p. 34; 8S - Kotter, 2011, p. 2).

Evaluation

- Most models emphasise the importance of **define reliable measures of the outcomes of interventions** from the beginning. This includes the need of defining realistic and measurable behavioural outcomes (CBSM - Chaudhary & Warner, 2015; IM - Kok, 2014; and CEDB - Stern, 2000) and other factors such as the return on investment of the intervention (CBSM - Chaudhary & Warner, 2015), all of which should correspond to desirable and practical changes (SF - Chapman, 2004, p. 34). (A more complete description of how to measure behavioural outcomes can be found below).
- Finally, several models also discuss the need to **gradually expand the effects of interventions** (CBSM - Chaudhary & Warner, 2015; and CRM - Kelly et al., 2003) **and institutionalize** the changes achieved by them (8S - Kotter, 2011, p. 2).

Transversal actions

- A frequent theme in the models that should be observed throughout preparation, implementation and evaluation is the need to **create collective action around the intervention**. This includes identifying the agents of change, stakeholders, adopters and implementers that might contribute to the intervention's objective (CRM - Kelly et al., 2003; IM - Kok, 2014; and C4D - UNICEF, 2016). Since social norms and behavioural changes are often transmitted and reinforced in the interactions that people have on an everyday basis, paying attention to the social networks at work in a context is essential (see Technical Note 3). Engaging these actors around the intervention can dramatically boost their efficacy and sustainability. According to intervention models:
 - Coalitions of relevant stakeholders should be established to coordinate and lead change efforts (CBPM - Bryant et al., 2000; 8S - Kotter, 2011)
 - The target community or group should be prepared to make sure it's ready to take action on social issues (CRM - Kelly et al., 2003) and allow them to set goals and make programmatic decisions (CBPM - Bryant et al., 2000).
 - Agents and stakeholders should be trained on the proposed changes and new procedures in order to allow them to disseminate the intervention and act on the new vision by eliminating obstacles and previous structures (8S - Kotter, 2011, p. 2; SNCT - UNFPA-UNICEF, 2016).
 - A sense of urgency and a shared vision around it should be created to facilitate the process of forming coalitions and effecting change (8S - Kotter, 2011, p. 2).
- Related to this, models also emphasise the need to conduct **continuous validations with stakeholders and participants of the project** (CBSM - Chaudhary & Warner, 2015;

IM - Kok, 2014; and CEDB - Stern, 2000). This is meant to ensure the local relevance, sustainability and effectiveness of interventions, and it should include both the planning and the results of the processes of diagnostic, design, implementation and evaluation (see below and Technical Note 3 - Lahlou, 2017; Yamin, 2012).

- Most models emphasise as well the need to establish a **continuous monitoring and evaluation cycle**, not only at the end of the project but also as a process that allows sustained adjustment of the interventions (MSM - Andreasen, 2011; CBPM - Bryant et al., 2000; 9P - Darnton, 2008a; IM - Kok, 2014; and CEDB - Stern, 2000).
- Finally, some models also focus on how **behavioural change can be linked (or deliberately leveraged) to broader social change** (CRM - Kelly et al., 2003; CCF - Knott et al., 2008; and C4D - UNICEF, 2016). This includes assessing and building “high levels of community ownership” towards change initiatives (CRM - Kelly et al., 2003, pp. 40–42), expanding and sustaining behavioural changes to create a “behavioural and social norm” which influences the “attitudes, values and aspirations” that make cultural capital and drive broader cultural change (CCF - Knott et al., 2008, p. 40), and engaging in participatory processes of dialogue and negotiation to collectively change norms and “eliminate harmful social and cultural practices” (C4D - UNICEF, 2016).

The following table summarizes the elements identified and some of the applied models that include useful guides for them:

Table 4. Main steps in applied models of behavioural change

DIAGNOSTIC		IMPLEMENTATION		EVALUATION	
Elements	Guides in	Elements	Guides in	Elements	Guides in
Identify and prioritize target behaviours	9P (Darnton, 2008b) CBSM (Chaudhary & Warner, 2015)	Pilots and pre-tests	CBSM (Chaudhary & Warner, 2015) IM (Kok, 2014) MSM (Andreasen, 2011)	Reliable outcome measures	CBSM (Chaudhary & Warner, 2015) CEDB (P. C. Stern, 2000) IM (Kok, 2014) SF (Chapman, 2004, p 34)
Diagnostics (contexts, groups, behaviours)	9P (Darnton, 2008b) CEDB (P. C. Stern, 2000) CBPM (Bryant et al., 2000) IM (Kok, 2014) CBSM (Chaudhary & Warner, 2015) SF (Chapman, 2004, p. 34)	Short term or early wins	8S (Kotter, 2011, p. 2) SF (Chapman, 2004, p. 34)	Expanding effects and institutionalizing	CBSM (Chaudhary & Warner, 2015) CRM (Kelly et al., 2003) 8S (Kotter, 2011, p. 2)
Previous research and experiences	9P (Darnton, 2008b)				
DESIGN					

Intervention design – basic characteristics	4E (Eppel et al., 2013) CCF (Knott et al., 2008) EAST (Service et al., 2014) CRM (Kelly et al., 2003)
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TRANSVERSAL	
Elements	Guides in
Collective action	8S (Kotter, 2011, p. 2) 9P (Darnton, 2008b) C4D (UNICEF, 2016) CBPM (Bryant et al., 2000) CRM (Kelly et al., 2003) IM (Kok, 2014) SNTC (UNFPA-UNICEF, 2016)
Stakeholder and participant validation	CEDB (P. C. Stern, 2000) CBSM (Chaudhary & Warner, 2015) IM (Kok, 2014)
Monitoring and evaluation cycle	9P (Darnton, 2008b) CEDB (P. C. Stern, 2000) CBPM (Bryant et al., 2000) IM (Kok, 2014) MSM (Andreasen, 2011)
From behavioural to social change	C4D (UNICEF, 2016) CCF (Knott et al., 2008) CRM (Kelly et al., 2003)

**Annex 3. Research ethics reviews from the London School of Economics and Political Science
and the Department of Psychological and Behavioural Science**

Word version at: <http://www.lse.ac.uk/intranet/LSEServices/policies/pdfs/school/resEthPolProForm.docx>

Annex 3: Research Ethics Review

This form should be completed for every research project that involves human participants or the use of information relating to directly identifiable individuals.

PART I - CHECKLIST

The Checklist is designed to identify the nature of any ethical issues raised by the research.

This checklist must be completed before potential participants are approached to take part in any research.

1. Name of Researcher: Paulius Yamin Slotkus

	Status (mark with an 'X' as appropriate)	Undergraduate student		Masters student	
		Research degree student	X	Staff	
	Email	p.yamin-slotkus@lse.ac.uk	Telephone number	07534921458	
	Department	Department of Psychological and Behavioural Science			

2. Student Details if applicable. Name:

	Degree programme:	MPhil/PhD in Social Psychology		
	Supervisor's name:	Saadi Lahlou	Supervisor's email:	s.lahlou@lse.ac.uk
	Supervisor's department:	Department of Psychological and Behavioural Science		

3. Title of the proposal and brief abstract

i) Title: Changing Behaviours to Change the World: Improving social-norm interventions to change behaviour in the real world.

ii) Abstract

(approx. 150-200 words. Your abstract should outline in non-technical language the purpose of the research and the methods that will be used.)

My PhD research project explores how behavioural change interventions based on social norms can be used to transform behaviours and create collective benefits in real-world contexts. While most of the literature on social norm interventions shows limited effects on behaviour¹, the particular case of Mayor Antanas Mockus in Colombia² shows that they can be much more effective than recognized in the literature. Through this project, I will explore two of the factors associated with this increased effectivity in the literature: the combined use of physical, psychological and social elements (layers that funnel behaviour under Installation Theory³) and the narrative persuasion effects (the effectivity of stories to change beliefs and behaviours⁴).

To this end, the following two studies will be conducted:

¹ See John, Sanders & Wang (2014). *The use of descriptive norms in public administration: a panacea for improving citizen behaviours?* Retrieved from SSRN at: <https://ssrn.com/abstract=2514536>.

² Behavioural change interventions applied by Mockus as Mayor of Bogotá reached impressive results including homicide rates reduced by 70% and deaths in traffic accidents by 65% in a 7 million people city (see Tognato, C. (2017). *Cultural Agents Reloaded: The Legacy of Antanas Mockus*. Cambridge, MA: Harvard University Press).

³ See: Lahlou, S. (2015). Social representations and social construction: the evolutionary perspective of installation theory. In G. Sammut, E. Andreouli, G. Gaskell, & J. Valsiner (Eds.), *The Cambridge Handbook of Social Representations*. (pp. 193–209). Cambridge: Cambridge University Press.

⁴ See: Hamby, A., Brinberg, D., & Jaccard, J. (2016). A conceptual framework of Narrative Persuasion. *Journal of Media Psychology*, Advanced online publication, 1–12.

- Study 1: Exploratory enquiry into the narratives around previous behavioural change interventions by Antanas Mockus using surveys and focus groups with citizens and detailed interviews with designers and performers of the original interventions.
- Study 2: Field experiment to test behavioural change interventions based on social norms, specifically with the objective of reducing fuel consumption in a transportation company in Colombia. Information will be collected about the company's truck drivers through surveys, participant observation, Subjective Evidence Based Ethnography⁵ (see annex 2) and collecting other institutional measures.

Annexes:

1. Research designs for studies 1 and 2
2. SEBE ethical issues and measures
3. LSE fieldwork assessment form
4. Data Management Plan

4. Funding

Is it proposed that the research will be funded? **Yes**

If so by whom? **The Marshall Institute for Philanthropy and Social Entrepreneurship (LSE).**

5. Where the research will be conducted

In what country/ies will the research take place? **Colombia**

If the research will be conducted abroad, have you referred to the LSE Fieldwork Policy Statement and completed the relevant fieldwork assessment form? (see [Note 1](#)) **Yes** (see Annex 3)

6. Data Management Plans

Please confirm whether you have completed a Data Management Plan and submitted to Datalibrary@lse.ac.uk ? (see [Note 2](#)) **Yes** (see Annex 4)

	<i>Please mark an X in the appropriate right-hand column/box</i>	Yes	No	Not certain
7. Research that <i>may</i> need to be reviewed by an external (non-LSE) Ethics Committee				
i	Will the study require Health Research Authority approval? (See Note 3)		X	
ii	Does the study involve participants lacking capacity to give informed consent? (See Note 4)		X	
iii	Is there any other reason why the study may need to be reviewed by another external (non-LSE) Ethics Committee? If yes, please give details here		X	
If your research will be reviewed by an external (non-LSE) ethics committee, go to Part II, C (there is no need to complete the rest of the Checklist)				
8. Consent				
i	Does the study involve children or other participants who are potentially or in any way vulnerable or who may have any difficulty giving meaningful consent to their participation or the use of their information? (See Note 5)		X	
ii	Are subjects to be involved in the study without their knowledge and consent		X	

⁵ Technique based on miniature cameras worn by participants at eye-level while conducting an activity and on replay interviews based on those recordings. See www.sebe-lab.net and Lahlou, S., Bellu, S. Le, & Boesen-Mariani, S. (2015). Subjective evidence based ethnography: method and applications. *Integrative Psychological and Behavioral Science*, 49(2), 16–38.

	<i>Please mark an X in the appropriate right-hand column/box</i>	Yes	No	Not certain
	(e.g. through internet-mediated research, or via covert observation of people in public places)?			
iii	Will the study require the co-operation of a gatekeeper for initial access to the groups or individuals to be recruited? (<i>Answer 'yes' to this question only if the involvement of a gatekeeper in your study might raise issues of whether participants' involvement is truly voluntary or of whether the gatekeeper might influence potential participants in some other way.</i>)	X		
9. Research Design / Methodology				
i	Does the research methodology involve the use of deception? (See Note 6)		X	
ii	Are there any significant concerns regarding the design of the research project? For example: <ul style="list-style-type: none"> • where research intrudes into the private sphere or delves into some deeply personal experience; • where the study is concerned with deviance or social control; • where the study impinges on the vested interests of powerful persons or the exercise of coercion or domination; or • where the research deals with things that are sacred to those being studied that they do not wish profaned. 		X	
iii	If the proposed research relates to the provision of social or human services is it feasible and/or appropriate that service users or service user representatives should be in some way involved in or consulted upon the development of the project?		X	
10. Financial Incentives				
i	Are there payments to researchers/participants that may have an impact on the objectivity of the research?		X	
ii	Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?		X	
11. Research Subjects				
i	Could the study induce unacceptable psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life? Will the study involve prolonged or repetitive testing?		X	
ii	Will the study involve discussion of sensitive topics? For example (but not limited to): sexual activity, illegal behaviour, experience of violence or abuse, drug use, etc.). (Please refer to the Research Ethics Policy, § 13).		X	
iii	Are drugs, placebos or other substances to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?		X	
12. Confidentiality				
i	Will research involve the sharing of data or confidential information beyond the initial consent given?		X	
ii	Is there ambiguity about whether the information/data you are collecting is considered to be public?		X	
iii	Will the research involve administrative or secure data that requires permission from the appropriate authorities before use?		X	
iv	Will the research involve the use of visual/vocal methods that potentially pose an issue regarding confidentiality and anonymity?	X		
13. Legal requirements				

	<i>Please mark an X in the appropriate right-hand column/box</i>	Yes	No	Not certain
	The Data Protection Act 1998 will apply to any data-processing activities entailed by this research. Is there any cause for uncertainty as to whether the research will fully comply with the requirements of the Act? (See Note 7)		X	
14. Dissemination				
	Are there any particular groups who are likely to be harmed by dissemination of the results of this project?		X	
15. Risk to researchers				
	Do you have any doubts or concerns regarding your (or your colleagues) physical or psychological wellbeing during the research period?		X	
16. Sensitive research materials				
	Will the research involve accessing security-sensitive material, such as material related to terrorism or to violent extremism of any kind, including, but not limited to, Islamist extremism and far-right extremism. (See Note 8)		X	

Please continue to Part II

PART II: SELF CERTIFICATION AND/OR NEXT STEPS

A If, after careful consideration, you have answered **No** to all the questions, you do not need to complete the questionnaire in Part III, unless you are subject to some external requirement that requires you to seek formal approval from the School's Research Ethics Committee. You can select **A** in the **Self-Certification Section** below, sign as appropriate and submit the form to your Head of Department, Research Centre Director, or their administrations as appropriate. Occasional audits of such forms may be undertaken by the School. Students who self-certify their research proposals must do so in consultation with their supervisors.

B If you have answered **Yes** or **Not certain** to any of the questions in sections 7-16 of the checklist you will need to consider more fully how you plan to deal with the ethical issues raised by your research. Answering the relevant questions in the Questionnaire in Part III below may assist you. Alternatively, your own department or institute may have alternative forms or procedures to assist you. If having done so you are wholly assured that adequate safeguards in relation to the ethical issues raised can and will be put in place, you may select **B** in the Self-certification Section below, sign as appropriate and submit the form to your Head of Department, Research Centre Director, or their administrations as appropriate. Occasional audits of such forms may be undertaken by the School.

C If you have answered Yes in section 7 that your research will be subject to an external ethics committee, please select **C** below and send the Checklist (questions 1-7) to research.ethics@lse.ac.uk. You should submit your research for ethics approval to the appropriate body. Once approval is granted please send a copy of the letter of approval to research.ethics@lse.ac.uk.

D If you are unable to self-certify your proposed research you should complete the questionnaire in Part III below and the 'Refer to Research Ethics Committee Section' at the end of the form.

SELF-CERTIFICATION

Select A, B or C (delete as appropriate):

I have read and understood the LSE Research Ethics Policy and the questions contained in the Checklist above and confirm:

B that adequate safeguards in relation to such issues can and will be put in place (I have completed the Questionnaire in Part III to describe these issues and safeguards).

Please complete the box below and sign the relevant section

Summary of any ethical issues identified and safeguards to be taken (expand box as necessary):

As the questions in Part I reveal, there are no outstanding ethical issues in the proposed project. The only questions that were answered with a "YES" in Part I is number 8.iii and 12.iv: "*Will the study require the co-operation of a gatekeeper for initial access to the groups or individuals to be recruited?*" and "*Will the research involve the use of visual/vocal methods that potentially pose an issue regarding confidentiality and anonymity?*".

Nevertheless, as described in the Questionnaire in Part III in more detail, these issues will be managed in the following ways:

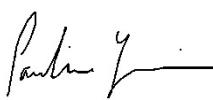

1. Gatekeeper cooperation. This has been marked because initial access to the transportation company was obtained through the CEO of the company and adopted as an institutional program, which *could* influence middle and lower levels of employees to decide to take part in the research and their overall behaviour. To counteract this, several safeguard measures will be undertaken in both studies to assure that participation is truly voluntary, including (see Part III below for more details):
 - Socialization and collection of questions and feedback from participants in the second study, including all truck drivers, middle management and other employees.

- Validation of all research and interventions activities and methods with stakeholders of the project, including representatives and/or union members of drivers and other employees, mid and high level management, as well as Thesis Committee Members on the part of LSE.
- Informed consents for all participants before undertaking any data collection activities.
- Voluntary participation, chance of withdrawing from the studies at any time and the possibility of omitting to answer any questions in surveys and interviews.
- Anonymization, debriefs and presentation of results and recommendations at the end of the project.
- In the case of SEBE, special measures will be included (see point 2 of this question below).

2. Visual methods, confidentiality and anonymity. This has been marked because of the use that the project will make of the Subjective Evidence Based Ethnography –SEBE technique (see footnote 5 in this document). To manage this, the standard ethical measures that have been used in other publications that use this technique will be followed. These include, apart from the measures mentioned in point 1 of this question, the control of data on the part of participants both before researchers have access to visual materials and during the rest of the process. Annex 2 of this document presents a description of the SEBE technique and the ethical measures that have been used in other researches and that will also be followed in this project.

Staff: I hereby confirm that I have undertaken training and/or have had significant experience in research ethics in the course of my career and/or have sought and obtained expert advice in connection with the ethical aspects of the proposed research:

Students: I hereby confirm that I have undertaken training in research ethics in the course of my studies and/or that I have consulted and been advised by my supervisor or other expert with regard the ethical implications of my proposed research.

Staff signature:	N/A	Date:	N/A
Student signature:		Date:	10/06/2017
Supervisor signature:		Date:	26/6/2017

By signing here the supervisor confirms that the student has been advised in relation to any ethical issues raised by her/his research; these have to the best of the supervisor's understanding been adequately addressed in the research design; and the student has been made aware of her/his responsibilities for the ethical conduct of her/his research.

Part III - QUESTIONNAIRE

The questionnaire enables you to explain how the ethical issues relating to your research will be addressed. If you are intending to submit your proposal to the Research Ethics Committee it needs to be completed in full.

17. Research aims

Please provide brief (no more than 500 words) details in non-technical language of the research aims, the scientific background of the research and the methods that will be used. This summary should contain sufficient information to acquaint the Committee with the principal features of the proposal. A copy of the full proposal should nonetheless be attached to this document in case it is required for further information.

As already mentioned, this project will explore two of the factors that are associated with the increased effectivity to transform behaviour that the interventions applied by Antanas Mockus show compared to most of the social norm

interventions described in the literature. These factors (installation layers⁶ and narrative persuasion⁷), will be explored and tested through two studies, as displayed in the following table:

Study	Context of research	Participants	Type of data collected and measures	Data collection methods
1. Exploratory enquiry into the narratives around previous behavioural change interventions by Antanas Mockus	The city of Bogotá, Colombia	600 citizens of Bogotá and 5 former designers and performers in the interventions	Qualitative and quantitative data on: <ul style="list-style-type: none"> Narratives and their basic characteristics Narrative persuasion elements 	<ul style="list-style-type: none"> Surveys (citizens) Focus group (citizens) Narrative interviews (designers and performers)
2. Field experiment to test behavioural change interventions based on social norms	A national transportation company in Colombia (behaviours associated with fuel consumption)	300 drivers employed by the company	Qualitative and quantitative data on measures associated with intervention goals (including detailed description of installations, social norms, etc).	<ul style="list-style-type: none"> Subjective Evidence-Based Ethnography –SEBE Participant observation Surveys Other institutional measures from the company

From a methodological point of view, interventions that use the same mechanisms and research methods have been designed and applied for a long time in social psychology and other fields⁸. This includes interventions that leverage social norms to achieve behavioural change⁹, those that are targeted on driving behaviours to reduce fuel consumption¹⁰ and those that use the same data collection methods¹¹. Indeed, my project does not innovate in the experimental design or in the research methods used, all of which have been adapted from those publications, but rather on the general focus and treatment conditions used for comparison.

18. Informed consent

i	Will potential participants be asked to give informed consent in writing and will they be asked to confirm that they have received and read the information about the study? If not, why not? <i>Please attach your proposed information sheet/consent form</i>
	Yes – all participants in both studies will be asked to give informed consent and will be given the possibility of being excluded from the study without stating their reasons. The proposed information sheet / consent form format that will be used in both studies (adapting it to the particularities of each one), is:

⁶ See: Lahlou, S. (2015). Social representations and social construction: the evolutionary perspective of installation theory. In G. Sammut, E. Andreouli, G. Gaskell, & J. Valsiner (Eds.), *The Cambridge Handbook of Social Representations*. (pp. 193–209). Cambridge: Cambridge University Press.

⁷ See: Hamby, A., Brinberg, D., & Jaccard, J. (2016). A conceptual framework of Narrative Persuasion. *Journal of Media Psychology*, Advanced online publication, 1–12.

⁸ See for a broad review John, Sanders & Wang (2014). *The use of descriptive norms in public administration: a panacea for improving citizen behaviours?* Retrieved from SSRN at: <https://ssrn.com/abstract=2514536>.

⁹ See for a review Tankard, M., & Paluck, E. L. (2016). Norm Perception as a Vehicle for Social Change. *Social Issues and Policy Review*, 10(1), 181–211. <https://doi.org/10.1089/acm.2005.11.578>

¹⁰ See for example Walnum, H. J., & Simonsen, M. (2015). Does driving behavior matter? An analysis of fuel consumption data from heavy-duty trucks. *Transportation Research Part D: Transport and Environment*, 36, 107–120. <https://doi.org/10.1016/j.trd.2015.02.016>

¹¹ See amongst others Lahlou, S., Boesen-Mariani, S., Franks, B., & Guelinckx, I. (2015). Increasing water intake of children and parents in the family setting: a randomized, controlled intervention using installation theory. *Annals of Nutrition and Metabolism*, 66(3), 26–30. <https://doi.org/10.1159/000381243>; Paluck, E. L., & Shepherd, H. (2012). The salience of social referents: A field experiment on collective norms and harassment behavior in a school social network. *Journal of Personality and Social Psychology*, 103(6), 899–915. <https://doi.org/10.1037/a0030015> and Bicchieri, C., Lindemans, J. W., & Jiang, T. (2014). A structured approach to a diagnostic of collective practices. *Frontiers in Psychology*, 5, 1–13.

	<p>Informed consent, image and information rights form</p> <p>Date:</p> <p>Name of participant:</p> <p>Contact address, telephone and email:</p> <p>Location:</p> <p>Nature of activity:</p> <p>Please read the following information and feel free to ask any questions. The aim of this study is</p> <ul style="list-style-type: none"> • <i>Study 1: to collect and analyse some of the narratives and perceptions around some of the interventions applied by Antanas Mockus in the city of Bogotá. To this end, different surveys, interviews and focus groups will be applied and conducted with citizens of Bogotá and with people involved in those interventions.</i> • <i>Study 2: to study and influence the behaviours of the drivers of this company which are associated with fuel consumption. To this end, surveys, interviews and recordings will be collected among drivers and pedagogical interventions will be applied in the company.</i> <p>I hereby agree to participate in a <i>(survey/interview/focus group/SubCam recording)</i> for the research project entitled “Changing behaviours to change the world”, including:</p> <p><i>(Answering a survey / interview questions about my perceptions and beliefs / Taking part in a 60 minute focus group / Wearing a Subcam during my own activity and participating in a debriefing session to comment the activity – YES NO).</i></p> <p>I agree in principle to my face and voice being identifiable <i>(Subcam recording only)</i>: YES NO</p> <p>I am aware these records will be used for scientific research and that some of my comments may be dubbed to the original clip.</p> <p>I also understand that:</p> <ul style="list-style-type: none"> • No <i>(image/quote/data)</i> where I can be identified will be used or distributed without my previous consent, and none of the information will identify me by name, unless with my explicit consent <i>(for Subcam recordings, “I will also be able to delete any materials before anyone sees them and at any time during the process, and I will be able to ask for anonymization of any materials where I appear at any time”)</i>. • I remain free to withdraw of the process at any time during the data capture and analysis without giving any reasons and without facing any negative consequences because of it. If I decide to withdraw, all data about me will be deleted. • I will not receive payment for participating in this research or for being filmed. <p>A copy of <i>(the final report / your answers / your recording)</i> will be available upon request. I understand I have non-exclusive rights to use these materials for private audiences or non-commercial venues as long as the source and the research programme are fully quoted, but that I cannot sell, distribute or modify any materials. I also understand that all materials remain property of the research project, which will have all rights for diffusion under the conditions stated above.</p> <p>Please feel free to direct any queries regarding the research to the team at the bottom of this page and at any time during or after the project.</p> <p>By signing here I agree to the above.</p> <p>These informed consents will be presented to all participants before engaging in any direct data collection procedures <i>(including surveys, focus groups, interviews and SEBE)</i>.</p>
ii	<p>If the research takes place within an online community, explain how informed consent will be obtained? What arrangements are in place for ensuring that participants do not include vulnerable groups or children?</p> <p>N/A</p>

iii	How has the study been discussed or are there plans to discuss the study with those likely to be involved, including potential participants or those who may represent their views?																
	<p>The overall study plans and methods will be discussed and validated by potential participants in both studies:</p> <ul style="list-style-type: none">Study 1: the objectives and data collection methods of the first study will be socialized and tested with potential participants (including citizens of Bogotá and designers and performers of the original interventions) before collecting the main data. As already mentioned, all participants will be presented with informed consents before taking part in any research activities (including surveys, focus groups and interviews).Study 2: currently, the project has been socialized and approved by the Directive Board, the CEO and the middle managers of the company. Before engaging in fieldwork, the same will be done with representatives (and/or union members) from the truck drivers and other employees. <p>The project will then be socialized with all the potential participants (all the truck drivers and employees of the company), feedback will be collected, and any questions addressed. At the end of the project, the results will be socialized with all employees and any feedback and questions will be resolved as well. As already mentioned, all participants that engage in data collection procedures will be presented with an informed consent (including surveys, interviews, focus groups and SEBE). Also, the results of all diagnostic activities and all interventions planned (which will only be designed once initial diagnostics are carried out in the field) will be socialized and validated with the stakeholders of the project before undertaking them (including the CEO, middle management, representatives and/or union members from drivers and employees, research associates, and the PhD Thesis Committee at LSE).</p>																
iv	Has information (written and oral) about the study been prepared in an appropriate form and language for potential participants? At what point in the study will this information be offered? (see Annex A of the research ethics policy for links to guidance on informed consent).																
	Yes – the procedures described in the section before (18.iii) will be used to ensure that potential participants are informed about the project, that their questions and feedback are answered and taken into account, and that they can choose not to participate at any time.																
v	Will potential participants be clearly informed that no adverse consequences will follow a decision not to participate or to withdraw during the study?																
	Yes – this information is included in the informed consent forms.																
vi	What provision has been made to respond to queries and problems raised by participants during the course of the study?																
	<p>As described in section 18.iii, queries and problems raised by participants will be collected and taken into account in both studies at different times. This includes socializing of the general aims and procedures of the project, testing of research methods, informed consents before each data collection procedure and validation with relevant stakeholders.</p> <p>Additionally, the contact details of the main researcher (and the company) will be made available in all forms and communications of the project and in all feedback addressed.</p>																
19. Research design and methodology																	
i	Where relevant, how does the research methodology justify the use of deception?																
	N/A – deception is not used in the project.																
ii	If the proposed research involves the deception of persons in vulnerable groups, can the information sought be obtained by other means?																
	N/A – deception is not used in the project.																
iii	How will data be collected and analysed during the project?																
	<p>Data will be collected and analysed using the following methods:</p> <table><tr><th>Study</th><th>Measures</th><th>Data collection methods</th><th>Type of data</th><th>File format storage</th><th>Analysis software</th></tr><tr><td rowspan="2">1. Exploratory enquiry into the narratives around</td><td rowspan="2">Qualitative and quantitate data on:<ul style="list-style-type: none">Narratives and their basic characteristics</td><td>Surveys (citizens)</td><td>Quantitative</td><td>Microsoft Excel STATA SE files</td><td>STATA (statistical package) Iramuteq (automated text analysis)</td></tr><tr><td>Focus group (citizens)</td><td>Qualitative (text and</td><td>.MOV Video files Microsoft Word files</td><td>Iramuteq (automated text analysis)</td></tr></table>	Study	Measures	Data collection methods	Type of data	File format storage	Analysis software	1. Exploratory enquiry into the narratives around	Qualitative and quantitate data on: <ul style="list-style-type: none">Narratives and their basic characteristics	Surveys (citizens)	Quantitative	Microsoft Excel STATA SE files	STATA (statistical package) Iramuteq (automated text analysis)	Focus group (citizens)	Qualitative (text and	.MOV Video files Microsoft Word files	Iramuteq (automated text analysis)
Study	Measures	Data collection methods	Type of data	File format storage	Analysis software												
1. Exploratory enquiry into the narratives around	Qualitative and quantitate data on: <ul style="list-style-type: none">Narratives and their basic characteristics	Surveys (citizens)	Quantitative	Microsoft Excel STATA SE files	STATA (statistical package) Iramuteq (automated text analysis)												
		Focus group (citizens)	Qualitative (text and	.MOV Video files Microsoft Word files	Iramuteq (automated text analysis)												

	previous behavioural change interventions by Antanas Mockus	<ul style="list-style-type: none">Narrative persuasion elements		video)		
			Narrative interviews (designers and performers)	Qualitative (text and video)	.MOV Video files Microsoft Word files	Iramuteq (automated text analysis)
	2. Field experiment to test behavioural change interventions based on social norms	Qualitative and quantitate data on measures associated with intervention goals (including detailed description of installations, social norms, etc).	Subjective Evidence-Based Ethnography – SEBE	Qualitative (text and video)	.MOV Video files Microsoft Word files	N/A
			Participant observation	Qualitative (text)	Microsoft Word files	N/A
			Surveys	Quantitative	Microsoft Excel STATA SE files	STATA (statistical package)
			Other institutional measures from the company	Quantitative	Microsoft Excel STATA SE files	STATA (statistical package)
Detailed information management and security measures have been included in the Data Management Plan for the project (see Annex 4), while methodological aspects have been detailed in sections 3 and 17 of this document, as well as in the research protocols of the relevant studies (see Annex 1).						
iv	How have the ethical and legal dimensions of the process of collecting, analyzing and storing the data been addressed?					
	Detailed procedures and measures for information management and security measures have been included in the Data Management Plan formulated for the project (see Annex 4), in accordance with the Data Protection Act of 1998.					
v	What concerns have been taken into account with regard to the preparation and design of the research project? If agencies, communities or individuals are to be directly affected by the research (e.g. participants, service users, vulnerable communities or relations), what means have you devised to ensure that any harm or distress is minimized and/or that the research is sensitive to the particular needs and perspectives of those so affected?					
	Even if no significant risks are expected in the project and participants do not belong to vulnerable communities, the measures already outlined in section 18.iii have been designed to socialize, validate and collect feedback and questions from participants and stakeholders in the project. Since the aim of the second study is to intervene a real-life context and some of its associated behaviours (driving in a transportation company), special care has and will be taken to discuss in a timely manner with all affected parties the procedures and research methods of the project. This is not only an ethical measure, but a necessary condition for the successful progress of the project.					
20. Ethical questions arising from the provision of incentives						
i	Are any incentives being offered to participants? If so, please provide details					
	No – incentives are not offered for participating in the research.					
21. Research participants						
i	Who do you identify as the participants in the project? Are other people who are not participants likely to be directly impacted by the project?					
	The potential participants of the project have been identified as: <ul style="list-style-type: none">Study 1:<ul style="list-style-type: none">600 citizens of Bogotá5 designers or performers of Mockus' previous interventionsStudy 2:<ul style="list-style-type: none">300 drivers of the transportation company Although the other employees of the transportation company are not directly considered as participants (i.e., no direct data collection methods will be applied to them), they will also be informed of the project and their questions and feedback will be taken into account (and as already mentioned, the stakeholders will validate all results and proposals). Moreover, because of the nature of the information, no direct or negative impacts are expected to other people as a result of the research.					
ii	What are the specific risks to research participants or third parties?					
	Following the anonymization and confidentiality procedures outlined, there are no risks expected for participants or other parties.					

iii	If the research involves pain, stress, physical or emotional risk, please detail the steps taken to minimize such effects.
	N/A – no such risks expected.
22. Confidentiality	
	What arrangements have been made to preserve confidentiality for the participants or those potentially affected, and compliance with data protection law?
	<p>Standard procedures for anonymization will be implemented in the project and are communicated to participants in all the consent forms, including:</p> <ul style="list-style-type: none"> - Using participant codes instead of names in all surveys, focus groups and interviews. - Information collected from individual participants will not be shared with the company or with any other participants or stakeholders (only aggregated and anonymized data will be shared). - All information collected will be stored in a secure location only accessible to the main researcher of the project (see Data Management Plan, Annex 4). - As is standard with SEBE ethics measures (see Annex 2), all participants will be offered the chance to erase any video files before researchers have access to them and to be anonymized for publication through blurring of images and silencing of voices.
23. Dissemination	
	Will the results of the study be offered to those participants or other affected parties who wish to receive them? If so, what steps have been taken to minimize any discomfort or misrepresentation that may result at the dissemination stage.
	<p>Yes – apart from the stakeholder group, all participants and employees of the company will have the opportunity to access the data collected about them as well as the general analyses, reports and publications of the project. General objectives and research procedures will be socialized at the start of the project, and results and recommendations will be presented after the project ends.</p> <p>Also, as already mentioned, feedback and questions from participants will be encouraged and addressed and contact data from the research team and the company will always be available.</p>
24. Risk to researchers	
	Are there any risks to researchers? If so, please provide details.
	None – the project will be carried out by researchers with broad experience in conducting fieldwork in the local context and in coordination with the company and with other stakeholders.

REFER TO RESEARCH ETHICS COMMITTEE

Approval is required by the Research Ethics Committee on one or more of the following grounds (please mark with an 'X' in the appropriate place in the right-hand column):

a.	<p>Significant ethical issues are raised by the research, including research characterised by one or more of the following features:</p> <p>(i) Research involving deception of participants, or which is conducted without their full and informed consent at the time the study is carried out or when the data is gathered, or which involves the use of confidential information.</p> <p>(ii) Research involving more than minimal risk of harm to participants, such as:</p> <ul style="list-style-type: none"> o research involving vulnerable groups o research involving personally intrusive or ethically sensitive topics o research involving groups where permission of a gatekeeper is normally required for initial access to members o research which would induce unacceptable psychological stress, anxiety or humiliation or cause more than minimal pain 	
b.	The researcher wants to seek the advice of the Research Ethics Committee	

c.	External obligations (for instance, funder requirements, data access requirements) require it	
d.	Research undertaken by a student or member of staff who has not received appropriate training or has insufficient experience in research ethics and has been unable to access appropriate advice or support.	

NOTES

1. For work to be conducted outside the UK please refer to the LSE Fieldwork Policy and complete the relevant fieldwork assessment form. For guidance see:

<http://www.lse.ac.uk/intranet/LSEServices/healthAndSafety/policy/FieldworkOffsiteVisits.aspx>

2. If you have not already done so, please complete a Data Management Plan (DMP). We recommend using the templates provided on DMPonline: <https://dmponline.dcc.ac.uk/> Guidance on writing a DMP and using DMPonline can be found on the Library webpages at:

<http://www.lse.ac.uk/library/usingTheLibrary/academicSupport/RDM/planning/dataManagementPlanning.aspx>

Unless you have a research funder that is listed, selected the generic DMP option. Please submit your completed DMPs to the Data Librarian on Datalibrary@lse.ac.uk

3. If your research involves NHS patients, staff or premises then it will most likely fall under the remit of the Health Research Authority; similarly, social care research involving adults, intergenerational social care studies involving adults and children or families and some proposals for social science studies situated in the NHS will fall under the remit of the Social Care Research Ethics Committee. For further guidance see: <http://www.hra.nhs.uk/research-community/before-you-apply/determine-which-review-body-approvals-are-required/>

4. Under the Mental Capacity Act 2005, research involving adults aged 16 or over with learning difficulties or who otherwise 'lack capacity' will be subject to approval by an NHS REC if that research is deemed to be 'intrusive'. For guidance see: <http://www.hra.nhs.uk/resources/research-legislation-and-governance/questions-and-answers-mental-capacity-act-2005/>

5. As general guidance, research participants under the age of 18 may be vulnerable. Also, see Note 4 above regarding the Mental Capacity Act.

6. Deception can occur at a variety of levels: for example, at one level, experimental methods may depend on participants being deliberately misled as to the true nature or purpose of the research in which they are taking part; at another, covert participant observation may entail an implicit deception as to the true identity and role of the researcher. Deception may be a legitimate and necessary feature of social scientific research, but its use must always be properly justified.

7. Please refer to the School's guidance on handling the Data Protection aspects of research data: <http://www.lse.ac.uk/intranet/LSEServices/policies/pdfs/school/datProRes.pdf> Further information about the Data Protection Act 1998 can be found in Annex A of the research ethics policy

8. Where staff or students are planning research projects that will entail accessing security-sensitive material, it is important we ensure that the necessary safeguards are in place to protect both the researcher and the School. Even where there are no ethical issues raised by the research (inasmuch that there are no human participants) it is very important that we have a log of any such research so that students or staff do not run the risk of being wrongly accused of accessing such materials for other/non-research reasons. If your research will involve accessing such material please email research.ethics@lse.ac.uk

PHD

Ethics Application

Department of Psychological and Behavioural Science

Title of project: Changing Behaviours to Change the World: Improving social-norm interventions to change behaviour in the real world.

Name of Researcher(s): Paulius Yamin-Slotkus

Email Address: p.yamin-slotkus@lse.ac.uk

Name of Supervisor (for MSc/PhD projects): Professor Saadi Lahlou

Date: 10/06/2017

		Yes	No	N/A
1	Will the proposed research entail any risk to the researcher(s)? (eg., entail travel to unstable regions, exposure to environmental risks, collection of sensitive data, or lone working in an unfamiliar context)		X	

If you ticked **Yes** to Q1, you should complete a **risk assessment form**

		Yes	No	N/A
2	Will you describe the main experimental procedures to participants in advance, so that they are informed about what to expect?	X		
3	Will you tell participants that their participation is voluntary?	X		
4	Will you obtain written consent for participation?	X		
5	If the research is observational, will you ask participants for their consent to being observed?	X		
6	Will you tell participants that they may withdraw at any time and for any reason?	X		
7	With questionnaires, will you give participants the option of omitting any questions they do not want to answer?	X		
8	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	X		
9	Will you debrief participants at the end of their participation (i.e. given them a brief explanation of the study)?	X		

If you ticked **No** to any of Q2-9, you should **tick box B** overleaf.

		Yes	No	N/A
10	Will your project involve deliberately misleading participants in any way?		X	
11	Is there any realistic risk of you or any participants experiencing either physical or psychological distress or discomfort? If Yes , give details on a separate sheet and state what you will tell them to do if they should experience any problems (e.g., who they can contact for help).		X	
12	Does your project involve work with animals?		X	
13	Do participants fall into any of the following special groups? Note that you may also need to obtain satisfactory CRB clearance (or equivalent for overseas students).	Schoolchildren (under age 18)	X	
		People with learning or communication difficulties	X	
		Parents	X	
		People in custody	X	
		People engaged in illegal activities (e.g. drug taking)	X	

If you have ticked **Yes** to any of Q10-13 you should **tick box B** overleaf.

There is an obligation on the lead researcher or supervisor to bring to the attention of the Departmental Ethics Committee any issues

with ethical implications not clearly covered by the above checklist.

PLEASE TICK EITHER BOX A OR BOX B BELOW AND PROVIDE THE DETAILS REQUIRED IN SUPPORT OF YOUR APPLICATION. THEN SIGN THE FORM.

Tick box

A. I consider that this project has no significant ethical implications to be brought before the Departmental Ethics Committee	X
---	----------

Give a brief description of participants and procedure (methods, tests used etc.) in up to 150 words.

My project includes two studies that require collection of empirical data and that are summarized in the following table (see Annex 1 for more details):

Study	Context of research	Participants	Type of data collected and measures	Data collection methods
1. Exploratory enquiry into the narratives around previous behavioural change interventions by Antanas Mockus	The city of Bogotá, Colombia	600 citizens of Bogotá and 5 former designers and performers in the interventions	Qualitative and quantitate data on: <ul style="list-style-type: none"> Narratives and their basic characteristics Narrative persuasion elements 	<ul style="list-style-type: none"> Surveys (citizens) Focus group (citizens) Narrative interviews (designers and performers)
2. Field experiment to test behavioural change interventions based on social norms	A national transportation company in Colombia	300 drivers employed by the company	Qualitative and quantitate data on measures associated with intervention goals (including detailed description of installations, social norms, etc).	<ul style="list-style-type: none"> Subjective Evidence-Based Ethnography –SEBE Participant observation Surveys Other institutional measures from the company

For all the research methods used, a standard set of ethical measures will be used, including: informed consents for all participants before undertaking any activities, voluntary participation and chance of withdrawing from the studies at any time, the possibility of omitting to answer questions in surveys and interviews, anonymization and a debrief and presentation of results and recommendations at the end of the project. In the case of SEBE, the usual ethical measures will be used (see Annex 2), also including apart from the aforementioned measures the control of data on the part of participants. For the second study, all research and intervention actions will be discussed and validated by representatives of the company and the drivers (or with union members), as well as with the Thesis Committee Members on the part of LSE. Additionally, following LSE's policy, a fieldwork assessment form (Annex 3) and a Data Management Plan (Annex 4) have also been completed.

Annexes:

1. Research design for studies 1 and 2
2. SEBE ethical issues and measures
3. LSE fieldwork assessment form
4. Data Management Plan

If you have ticked box A, then sign and submit this form (and any attachments) to the ISP Ethics Committee.

Tick box

B. I consider that this project may have ethical implications that should be brought before the Departmental committee, and/or it will be carried out with children or other vulnerable populations	
--	--

Please provide all the further information listed below on a separate attachment.

1. Title of project
2. Purpose of project and its academic rationale
3. Brief description of methods and measurements
4. Participants: recruitment methods, number, age, gender, exclusion/inclusion criteria
5. Consent, participant information, debriefing (***attach information, consent, & debrief sheets**)
6. A clear concise statement of ethical issues raised by the project and how you intend to deal with them.
7. Estimated start date and duration of the project.

If any of the above information is missing, your application will be returned to you.

If you have ticked box B, then sign and submit this form along with a separate document providing the above information (and any

ments) to the ISP Ethics Committee.

I am familiar with the BPS Guidelines for ethical practices in psychological research and I have discussed them with other researchers involved in the research (e.g., supervisor or co-researcher).

Student signature

Paulius Yamin

Print Name PAULIUS YAMIN

Date 10/06/2017

Supervisor signature

Saadi Lahlou

Print Name

Saadi Lahlou

Date 27/6/2017

Statement of Ethical Approval: To be Completed by the Chair of the Ethics Committee

This project has been considered using agreed procedures and is now approved. Signature Print Name Date

Signature

Dr J. Garcia

Print Name

GARCIA

Date

27/6/17

Annex 4. Data Management Plan for the project

Annex 4. Data Management Plan for the project

Changing Behaviours to Change the World

Plan Name LSE Data Management Plan

Plan ID -

Grant number -

Principal Investigator / Researcher Paulius Yamin Slotkus

Plan Data Contact p.yamin-slotkus@lse.ac.uk

Plan Description This PhD research project explores how behavioural change interventions based on social norms can be used to transform behaviours and create collective benefits in real-world contexts. And while most of the literature on social norm interventions shows limited effects on behaviour, the particular case of Mayor Antanas Mockus in Colombia shows that they can be much more effective than recognized in the literature. Through this project, I will explore two of the factors associated with this increased effectivity in the literature: the combined use of physical, psychological and social elements (layers that funnel behaviour under Installation Theory) and the narrative persuasion effects (the effectivity of stories to change beliefs and behaviours). To this end, the following two studies will be conducted: • Study 1: An exploratory enquiry into the narratives around previous behavioural change interventions by Antanas Mockus using surveys and focus groups with citizens and detailed interviews with designers and performers of the original interventions. Study 2: A field experiment to test behavioural change interventions based on social norms, specifically with the objective of reducing fuel consumption in a transportation company in Colombia. Information will be collected about the company's truck drivers through surveys, participant observation, Subjective Evidence Based Ethnography (see annex 2) and collecting other institutional measures from the company.

Funder -

Institution Other

Your ORCID -

Data collection

Provide a summary of the data addressing the following issues: Specify the types and formats of data generated/collected Existing data being re-used (if any) The origin(s) of the data

The following data collection methods, file formats for storage and analysis software will be used in each of the studies of the project:

Study	Context of research	Participants	Measures	Data collection methods	Type of data	File format storage	Analysis software
1. Exploratory enquiry into the narratives around previous behavioural change interventions by Antanas Mockus	The city of Bogotá, Colombia	600 citizens of Bogotá and 5 former designers and performers in the interventions	Qualitative and quantitative data on: · Narratives and their basic characteristics · Narrative persuasion elements	Surveys (citizens)	Quantitative	Microsoft Excel STATA SE files	STATA (statistical package) Iramuteq (automated text analysis)
				Focus group (citizens)	Qualitative (text and video)	.MOV Video files Microsoft Word files	Iramuteq (automated text analysis)
				Narrative interviews (designers and performers)	Qualitative (text and video)	.MOV Video files Microsoft Word files	Iramuteq (automated text analysis)
2. Field experiment to test behavioural change interventions based on social norms	A national transportation company in Colombia (behaviours associated with fuel consumption)	300 drivers employed by the company	Qualitative and quantitative data on measures associated with intervention goals (including detailed description of installations, social norms, etc).	Subjective Evidence-Based Ethnography –SEBE	Qualitative (text and video)	.MOV Video files Microsoft Word files	N/A
				Participant observation	Qualitative (text)	Microsoft Word files	N/A
				Surveys	Quantitative	Microsoft Excel STATA SE files	STATA (statistical package)
				Other institutional measures from the company	Quantitative	Microsoft Excel STATA SE files	STATA (statistical package)

All data will be collected in digital files created, stored and administered by the main researcher and sent to research associates to be filled using laptops and iPads, except from some of the surveys, which for logistic reasons will be collected on paper and then transferred by them to the same digital files used for the rest of the data. The main researcher will keep a separate inventory of all entries (both digital and paper) and files, and will be responsible for receiving the files from research associates and integrating the data into general files in a secure location accessible (in a read-only capacity) by them. The formats used and this procedure will allow sharing the data easily and securely

between researchers and effectively performing the relevant analyses.

Files will be stored following a structure of (study/data collection method/file format) and version numbers will be marked on the name of files using the letter V and the corresponding number. For qualitative data, each entry will be kept in a separate file to reduce the risk of data loss.

Data Storage and Information Security

Have you passed the [LSE Information Security User Awareness Training](#) course?

- Yes

Completed on 27/06/2017

Do you have sufficient storage or will you need additional space?

- Yes

All data will be stored and continuously updated in identical copies in 4 different locations to avoid any data loss. These (and their capacities) are:

1. Dropbox Plus: 1.1 TB
2. External storage hard drive: 500 GB
3. Main researcher personal computer: 1.1 TB
4. LSE IMT personal file space: 10 GB

The main researcher will be responsible for administering all locations and backing up information at least once a day in fieldwork periods and once a week during all other periods. Research associates will have read-only access capabilities (and download), but not editing, which will be only performed by the main researcher.

The Dropbox Plus platform performs automatic backups of all changes in data as soon as they are introduced, and stores all versions of files as well as deleted files for 30 days. Both of these features greatly increase information security and integrity.

Has responsibility for backup and recovery been identified and allocated?

- Yes

See question before.

Can you describe how you will ensure collaborators can access your data securely?

- Yes (please describe in the comment area)

As already mentioned, all data will be accessible on read and download only capabilities by all research associates via the Dropbox Plus platform. Information will only be edited by the main researcher, and all associates will need a personal password to access the information.

Research associates will also sign an agreement to not share any of the information and delete any copies in their personal computers after use.

Does the data provider have specific requirements about storage and access, require you to fill in a questionnaire, or submit details about the conditions data may be held under?

- No

Research ethics

Does your research involve human participants (living or dead), or involve data about directly identifiable human subjects?

- Yes

Detailed ethical procedures have been described in the LSE Research Ethics Review Checklist and the Ethics Application of the Department of Psychological and Behavioural Science forms for this project (see documents for complete information). These include informed consents for all participants before undertaking any activities, voluntary participation and chance of withdrawing from the studies at any time, the possibility of omitting to answer questions in surveys and interviews, anonymization and a debrief and presentation of results and recommendations at the end of the project. Also, in the case of video recordings using the Subjective Evidence Based Ethnography method, participants will review and have the possibility of erasing any data before researchers have access to them or at any time during the process. Also, for the second study, all research and intervention actions will be discussed and validated by representatives of the company and the drivers (or with union members), as well as with the Thesis Committee Members on the part of LSE.

If you are collecting primary data, describe your process of obtaining informed consent from research participants.

As discussed before, all participants will complete and sign the informed consent forms prepared for each study (see LSE Research Ethics Review Checklist for more details and an initial version). This will be done before engaging in any data collection activities, and will include the possibility of withdrawing from the study at any time, without giving any reasons and without any negative consequences for the subject, and the possibility of asking for the anonymization of any data.

If you are collecting primary data that can identify living individuals, how will you anonymise/pseudoanonymise personal data?

All names will be changed for participant codes and contact information will be kept separate from collected data. For video files, all participants will be offered the possibility of blurring their faces and silencing their voice (adding subtitles) so that they cannot be identified.

Data ownership

Clarify the copyright and intellectual property ownership of the data.

Participants will have non-exclusive rights to use these materials for private audiences or non-commercial venues as long as the source and the research programme are fully quoted, but that I cannot sell, distribute or modify any materials. The materials, nevertheless, will remain property of the research project, which will have all rights for diffusion under the ethical and privacy conditions included in consent forms (which state that "No data where I can be identified will be used or distributed without my previous consent, and none of the information will identify me by name, unless with my explicit consent"). All this information will be included in informed consents and explained to participants. All participants will receive upon request a copy of their own data and of the final report. No individual data will be shared with any of the stakeholders (just collective anonymized data and reports will).

Preservation and data sharing

What is the long-term preservation and sharing plan for the dataset? Outline how these data will be made available. - Outline any restrictions on data sharing due to data sensitivity. - Outline any restrictions on data sharing due to the need to protect proprietary or patentable data.

Data will only be shared once it is ready for publication in academic outlets (including journals, presentations and blogs). Annexes and support materials will be included in these publications (such as images and video files, but also tables with metadata) to encourage reuse, but taking great care that no personal information or individual identities are identifiable (unless participants specifically ask for their identity to be identifiable). As is specified in informed consent forms, no data where an individual can be identified will be used or distributed without his previous consent, and none of the information will identify any individual by name.

Materials will be shared under the resource administrator conditions or under a Creative

Commons Attribution + Non-commercial license.

Following LSE Research Data Policy, all data will be retained for a minimum of 7 years after the project has ended.

Documentation and metadata

What documentation and metadata will accompany the data to help ensure it has context and meaning?

The methodological procedures and context data of all research activities undertaken will be registered during the project and presented in a clear way in the relevant sections of publications and in dedicated annexes (if necessary).

All relevant quantitative and qualitative metadata (such as data sets and complete transcriptions) will be retained and will be included as annexes of publications to be reused and analysed (always protecting the privacy of participants, of course).

Contact data for the main researcher will be provided to all participants and in all publications about the project.

Costs

Will additional resources be needed for preservation and making the data sharable?

A monthly cost of £8 per month for the Dropbox Plus service will be covered by the main researcher, as well as the use of external hard drives.

Annex 5. Systematic review research protocol and codebook (Study 1)

1. Purpose

This literature review emerges from the need for a systematic overview of the main strategies and mechanisms that are applied by behavioural change interventions based on social norms. Apart from providing a much-needed overview of current practice in this area, this effort can contribute to a clearer design, reporting, comparison, and classification of them, as well as to better understandings about how these interventions achieve behavioural change. Different researchers have described some of the main practical intervention techniques or mechanisms that can be used in interventions to intentionally transform behaviour. Some of the most popular examples include Michie et al.'s (2011) identification of Behavioural Change Techniques (also from a systematic review), and Sunstein's "nudges" (2016). But although relevant and useful, these techniques don't consider directly social regulation and social norms (but rather processes such as social support or comparison of behaviours).

To ensure a broad and balanced sample of studies, some procedures commonly used in systematic literature reviews will be employed (see Okoli & Schabram, 2010). Nevertheless, this review will not be a meta-analysis³² (see Littell, Corcoran, & Pillai, 2008), and so no causal inferences will be drawn between the use of these two elements and their overall effectivity, or about the statistical representativeness of these elements in the general literature (such an effort would be in any case problematic because of the very different characteristics of the interventions).

Rather, a qualitative synthesis (Okoli & Schabram, 2010) of the collected information will be conducted in order to explore and propose an analytical framework for the main strategies and mechanisms through which those interventions were applied in the literature. The two research questions that will guide this review are:

- *What intervention strategies and mechanisms are used in the behavioural change interventions based on social norms in the literature?*
- *What are the main dimensions that can be used to characterize and organize these strategies and mechanisms?*

This document, which constitutes the working version of our research protocol, has been structured using Okoli and Schabram's (2010, p. 7) eight steps to guide a systematic literature review: (1) Purpose, (2) Protocol and training, (3) Literature search, (4) Practical screen, (5) Quality appraisal, (6) Data extraction, (7) Synthesis of studies and (8) Writing the review. Additionally, a last section (9) presents the timetable.

2. Protocol and training

³² This would be difficult and problematic with the research question of this review, and would imply, among other measures, defining broader keywords and more strict inclusion and quality criteria, as well as expecting more statistical controls than the studies in this area seem to have (as becomes clear in John et al., 2014 – see also Littell, Corcoran, & Pillai, 2008).

The detailed procedures to be followed in the review will be specified, tested and updated through this document. All the researcher will be trained on its use and intra and inter-rater reliability measured and managed. Following Okoli and Schabram (2010, pp. 17–18), clear forms and tables will be produced and pre-tested to ensure uniformity in note-taking and reviewing techniques. Disputes between the researchers (PY, MF and SL -Sara Levy) will be resolved by mutual agreement or consulting a third researcher (SL – Saadi Lahlou), and by subsequently updating the research protocols.

3. Literature search

Studies will be first collected with a keyword search in databases (PsycINFO, Scopus, Web of Science, Embase and Pubmed) or interfaces (EBSCOhost and OvidSP) depending on initial tests. The following Boolean formula will be used in the title field only:

“social norm*” OR “descriptive norm*” OR “injunctive norm*” OR “collective norm” OR “normative”

AND

“intervention” OR “field study” OR “field experiment” OR “randomised controlled trial” OR “randomized controlled trial” OR “program” OR “campaign” OR “initiative” OR “change”

Then, when an initial sample has been build using the practical screen and quality appraisal procedures (see 4 and 5 below), we will use the following additional mechanisms to collect more references:

- Backwards search, which includes taking all the articles in the initial sample and screening the ones listed in their reference lists for inclusion
- “Forward search” (Okoli & Schabram, 2010), or screening all the articles that have cited the ones in the initial sample (using Google Scholar)
- Contact of the authors of the articles in the original sample and of experts in the field through the mailing list of the European Association for Social Psychology.

All the additional articles selected for inclusion will be reviewed through the same practical screen and quality appraisal criteria specified below (4 and 5).

4. Practical screen

Abstracts of the collected articles will be reviewed to exclude the articles that do not correspond to the purpose of this study. Only studies that conform to the following criteria will be included in the study:

- **Studies that are published as papers, even if not peer reviewed** (because of the difficulty of obtaining digital versions of complete texts of other materials such as book chapters, posters or dissertations)
- **Studies of interventions conducted in field settings, even if online** (excluding laboratory settings or conceptual work)

- **Studies that present interventions that explicitly use social norms in their intervention design**
- **Studies that include an abstract in English** (articles in other languages that include this will be translated if relevant, but search procedures will exclude those that do not have a title in English)

When in doubt, studies will be included at this stage for further revisions.

5. Quality appraisal

Because of the focus of this review (qualitative rather than statistical synthesis) and the nature of the collected studies, this review will not include strong controls on the quality of the studies. Two very basic criteria coded dichotomously (as fulfilled and not fulfilled) will be used to exclude studies based on their quality:

- Lack of behavioural outcome measures, self-reported or observed (excluding those that measure only attitudes or beliefs)
- Lack of clear description of methodological procedures and intervention methods used.

6. Data extraction

Data extraction will be conducted by reviewing the complete texts of included articles using an Excel form. As already mentioned, pre-tests will be conducted and intra and inter-rater reliability measured and managed. The following fields will be included in this form, together with pre-set options whenever possible and detailed definitions for each one of them:

Table 1. Data extraction fields and definitions

Field	Definition	Type of question (Open / Closed)
Reference	Study reference in APA format	Open
Year	Year of publication	Closed
Country	Country where the intervention was conducted	Closed
No. of interventions	Number of interventions reported in the study that meet the practical screen and quality appraisal criteria	Closed
Intervention topic	Subject area of the intervention. This will be collected in an open fashion and then grouped inductively. Examples of common subject areas include: <ul style="list-style-type: none"> • Health • Violence • Energy conservation • Environment conservation 	Open (grouped)
Participant type	Category used to describe the participants in the interventions. This will be collected in an open fashion and then grouped inductively. Examples of common participant types include: <ul style="list-style-type: none"> • Students • Employees • Residents 	Open (grouped)

Field	Definition	Type of question (Open / Closed)
Sample size	Sample size of the study, coded as follows: 1 – less than 200 participants 2 – from 201 to 500 participants 3 – from 501 to 1000 participants 4 – more than 1000 participants	Closed
Experimental design	Type of experimental design used in the study, coded as follows: 1 – “treatment conditions”, for studies that include a control group and one or more treatment conditions 2 – “No control pre-post”, for studies that did not include a control group, only pre-post test measures	Closed
Type of behavioural outcome measures	Type of outcome measure of behaviour, coded as follows: 1 – “self-report”, for studies that only included self-reported measures of behaviour (asking participants to report their own behaviour on a certain period of time) 2 – “behaviour recording” for studies that observed and recorded actual behaviours on participants	Closed
Statistically significant effects on behaviour	Statistically significant effects on behaviour in the treatment conditions of the study that used social norms explicitly, coded as: 1 – “Yes”, at least one of the conditions that used social norms explicitly achieved significant effects on behaviour of up to $p=0.05$ 2 – “No”, none of the conditions that used social norms explicitly achieved significant effects on behaviour of up to $p=0.05$	Closed
Last outcome measurement after intervention (months)	Number of months between the end of the intervention and the last measure of outcomes reported in the paper	Closed
STRATEGIES <i>Coded as: 1 – yes ; 2 – no</i>		
In-situ	Interventions were applied in the same context where the target behaviour happens (for example, a poster in a toilet to encourage hand washing)	Closed
Remote	Interventions were applied in a context that is different from the context in which the target behaviour happens (for example, sending a letter home to encourage healthy eating at the office)	Closed
GSI	Interventions used “Group Summary Information”, defined as information that summarizes the behaviour or opinions of a group (usually through proportions, such as: 75% of guests reuse their towels)	Closed
EBO	Interventions used “Exposure to behaviours and opinions”, defined as exposing participants to the behaviours or opinions of others without summarizing the general trends (for example through discussions or images of peers doing the target behaviour or communicating their support for it)	Closed
INTERVENTION MECHANISMS:		
Intervention mechanisms	Please copy the excerpts of papers that described the concrete mechanisms used in the intervention to transmit normative information or expose participants to it (for example, workshops, letters, emails, or posters). Excerpts will then be coded thematically to find regularities.	Open

Field	Definition	Type of question (Open / Closed)
Comments:		
Did any “Fields” pose problems to fill?	Special difficulty in filling any of the fields, rated in a dichotomic manner (yes/no).	Closed
If yes, which ones and why?	List of all the fields that posed the difficulty and the reasons why.	Open

7. Synthesis of studies

As already mentioned, the data extracted from the included articles will be analysed through a qualitative synthesis (Okoli & Schabram, 2010), much in the same way in which Jones' (2014) or Kuntsche and Kuntsche's (2016) reviews do: “the results obtained will not be pooled in a meta-analysis because, as expected, the studies were highly heterogeneous [...]. Instead, the present study will provide a tabular and narrative summary of the findings” (Kuntsche & Kuntsche, 2016, p. 96). The basic characteristics of the studies will be assessed together with the use they make of the two chosen theoretical frameworks (if any).

8. Writing the review

The results of the review will be organized in a paper and sent to publication. The format of well-known reviews of this type will be followed (see Jones, 2014; Klettke, Hallford, & Mellor, 2014; Kuntsche & Kuntsche, 2016; Pilton, Varese, Berry, & Bucci, 2015) and a clear description of the protocol will be presented.

9. Timetable

STEPS	2017			2018			2019
	1-4	5-8	9-12	1-4	5-8	9-12	
(1) Purpose							
(2) Protocol and training							
(3) Literature search							
(4) Practical screen							
(5) Quality appraisal							
(6) Data extraction							
(7) Synthesis of studies							
(8) Writing the review							

Annex 6. Complete list of coded studies (Study 1)

Annex 6. Complete list of coded studies - A. Study characteristics

Using social norms to change behavior and increase sustainability in the real world: a systematic review of the literature

S1. Full coded set

3

No.	Reference	Year	Country	No. of interventions	Intervention topic	Participant type	Sample size	Experimental design	Type of behavioural outcome measures	Statistically significant effects on behaviour	Last outcome measurement after intervention (months)
1	Agha, S., & Van Rossem, R. (2004). Impact of a school-based peer sexual health intervention on normative beliefs, risk perceptions, and sexual behavior of Zambian adolescents. <i>Journal of Adolescent Health</i> , 34 (5), 441–452. https://doi.org/10.1016/j.jadohealth.2003.07.016	2004	Zambia	1	Sexual health / HIV	Students	1	Treatment conditions	Self-report	Yes	6
2	Balvig, F., & Holmberg, L. (2011). The ripple effect: A randomized trial of a social norms intervention in a Danish middle school setting. <i>Journal of Scandinavian Studies in Criminology and Crime Prevention</i> , 12 (1), 3–19. https://doi.org/10.1080/14043858.2011.561619	2011	Denmark	1	Health behaviour	Students	1	Treatment conditions	Self-report	No	12
3	Bateson, M., Callow, L., Holmes, J. R., Redmond Roche, M. L., & Nettle, D. (2013). Do images of “watching eyes” induce behaviour that is more pro-social or more normative? A field experiment on littering. <i>PLoS ONE</i> , 8 (12), 1–9. https://doi.org/10.1371/journal.pone.0082055	2013	UK	1	Pro-environmental	Cyclists	2	Treatment conditions	Behaviour recording	Yes	0
4	Bauer, R., Eberhardt, I., & Smeets, P. (2017). Financial Incentives Beat Social Norms : A Field Experiment on Retirement Information Search. <i>SSRN Electronic Journal</i> . Retrieved from https://ssrn.com/abstract=3023943	2017	Netherlands	1	Tax and retirement	Pension fund participants	3	Treatment conditions	Behaviour recording	No	1
5	Bertholet, N., Daepfen, J.-B., Cunningham, J. A., Burnand, B., Gmel, G., & Gaume, J. (2016). Are young men who overestimate drinking by others more likely to respond to an electronic normative feedback brief intervention for unhealthy alcohol use? <i>Addictive Behaviors</i> , 63 , 97–101. https://doi.org/10.1016/j.addbeh.2016.07.015	2016	Switzerland	1	Alcohol	Drinkers - drug users	2	Treatment conditions	Self-report	Yes	6
6	Bewick, B. M., West, R. M., Barkham, M., Mulhern, B., Marlow, R., Traviss, G., & Hill, A. J. (2013). The effectiveness of a Web-based personalized feedback and social norms alcohol intervention on United Kingdom university students: Randomized controlled trial. <i>Journal of Medical Internet Research</i> , 15 (7), 1–10. https://doi.org/10.2196/jmir.2581	2013	UK	1	Alcohol	Students	3	Treatment conditions	Self-report	Yes	3
7	Bewick, B. M., Trusler, K., Mulhern, B., Barkham, M., & Hill, A. J. (2008). The feasibility and effectiveness of a web-based personalised feedback and social norms alcohol intervention in UK university students: A randomised control trial. <i>Addictive Behaviors</i> , 33 (9), 1192–1198. https://doi.org/10.1016/j.addbeh.2008.05.002	2008	UK	1	Alcohol	Students	2	Treatment conditions	Self-report	Yes	4.75
8	Boen, F., Van Hoecke, A.-S., Smits, T., Hurkmans, E., Fransen, K., & Seghers, J. (2017). <i>Portraying role models to promote stair climbing in a public setting: The effect of matching sex and age</i> (Unpublished manuscript obtained through email on 30 October 2017).	Unpublished	Germany	1	Health behaviour	Passers-by	3	Treatment conditions	Behaviour recording	Yes	0
9	Boyle, S. C., Earle, A. M., LaBrie, J. W., & Smith, D. J. (2017). PNF 2.0? Initial evidence that gamification can increase the efficacy of brief, web-based personalized normative feedback alcohol interventions. <i>Addictive Behaviors</i> , 67 , 8–17. https://doi.org/10.1016/j.addbeh.2016.11.024	2017	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	0.5

10	Brent, D. A., Lott, C., Taylor, M., Cook, J., Rollins, K., Stoddard, S., ... Cook, J. (2017). <i>Are Normative Appeals Moral Taxes? Evidence from A Field Experiment on Water Conservation</i> (Working paper 2017-07 - Department of Economics, Louisiana State University). Retrieved from http://faculty.bus.lsu.edu/workingpapers/pap17_07.pdf	2017	US	1	Pro-environmental	Residents	3	Treatment conditions	Behaviour recording	Yes	6
11	Bruce, S., & Keller, A. (2007). Applying Social Norms Theory within groups: Promising for high-risk drinking. <i>NASPA Journal</i> , 44 (1), 101–122. https://doi.org/10.2202/1949-6605.1757	2007	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	9
12	Brudermann, T., Bartel, G., Fenzl, T., & Seebauer, S. (2015). Eyes on social norms: A field study on an honor system for newspaper sale. <i>Theory and Decision</i> , 79 (2), 285–306. https://doi.org/10.1007/s11238-014-9460-1	2017	Austria	1	Integrity - morality	Passers-by	3	Treatment conditions	Behaviour recording	Yes	6
13	Celio, M. A., & Lisman, S. A. (2014). Examining the efficacy of a personalized normative feedback intervention to reduce college student gambling. <i>Journal of American College Health</i> , 62 (3), 154–164. https://doi.org/10.1080/07448481.2013.865626	2014	US	1	Gambling	Students	0	Treatment conditions	Behaviour recording	Yes	0.25
14	Chernoff, R. A., & Davison, G. C. (2005). An evaluation of a brief HIV/AIDS prevention intervention for college students using normative feedback and goal setting. <i>AIDS Education and Prevention</i> , 17 (2), 91–104. https://doi.org/10.1521/aeap.17.3.91.62902	2005	US	1	Sexual health / HIV	Students	0	Treatment conditions	Self-report	Yes	1
15	Cleveland, M. J., Hultgren, B., Varvil-Weld, L., Mallett, K. A., Turrissi, R., & Abar, C. C. (2013). Moderation of a parent-based intervention on transitions in drinking: Examining the role of normative perceptions and attitudes among high- and low-risk first-year college students. <i>Alcoholism: Clinical and Experimental Research</i> , 37 (9), 1587–1594. https://doi.org/10.1111/acer.12126	2013	US	1	Alcohol	Students	3	Treatment conditions	Self-report	Yes	5
16	Collins, S. E., Carey, K. B., & Sliwinski, M. J. (2002). Mailed personalized normative feedback as a brief intervention for at-risk college drinkers. <i>Journal of Studies on Alcohol</i> , 63 (5), 559–567. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0036746433&partnerID=40&md5=4a617da60cac5b68e34feac68dfe404b	2002	US	1	Alcohol	Students	0	Treatment conditions	Self-report	Yes	6
17	Collins, S. E., Kirovac, M., Lewis, M. A., Witkiewitz, K., & Carey, K. B. (2014). Randomized controlled trial of web-based decisional balance feedback and personalized normative feedback for college drinkers. <i>Journal of Studies on Alcohol and Drugs</i> , 75 (6), 982–992.	2014	US	1	Alcohol	Students	2	Treatment conditions	Self-report	Yes	12
18	Cross, J. E., & Peisner, W. (2009). RECOGNIZE: A social norms campaign to reduce rumor spreading in a junior high school. <i>Professional School Counseling</i> , 12 (5), 365–377. https://doi.org/10.5330/PSC.n.2010-12.365	2009	US	1	Bullying / harassment behaviour	Students	2	No control pre-post	Self-report	No	24
19	Cunningham, J. A., & Wong, H. T. A. (2013). Assessing the immediate impact of normative drinking information using an immediate post-test randomized controlled design: Implications for normative feedback interventions? <i>Addictive Behaviors</i> , 38 (6), 2252–2256. https://doi.org/10.1016/j.addbeh.2013.02.005	2013	Canada	1	Alcohol	Students	0	Treatment conditions	Self-report	Yes	0
20	Davis, J. P., Houck, J. M., Rowell, L. N., Benson, J. G., & Smith, D. C. (2016). Brief Motivational Interviewing and Normative Feedback for Adolescents: Change Language and Alcohol Use Outcomes. <i>Journal of Substance Abuse Treatment</i> , 65 , 66–73. https://doi.org/10.1016/j.jsat.2015.10.004	2016	US	1	Alcohol	Drinkers - drug users	0	Treatment conditions	Self-report	Yes	3
21	Dejong, W., Schneider, S. K., Towvim, L. G., Murphy, M. J., Doerr, E. E., Simonsen, N. R., ... Scribner, R. A. (2009). A multisite randomized trial of social norms marketing campaigns to reduce college student drinking: A replication failure. <i>Substance Abuse</i> , 30 (2), 127–140. https://doi.org/10.1080/08897070902802059	2006	US	1	Alcohol	Students	3	Treatment conditions	Self-report	No	36
22	Doumas, D M, & Hannah, E. (2008). Preventing high-risk drinking in youth in the workplace: A web-based normative feedback program. <i>Journal of Substance Abuse Treatment</i> , 34 (3), 263–271. https://doi.org/10.1016/j.jsat.2007.04.006	2008	US	1	Alcohol	Employees	0	Treatment conditions	Self-report	Yes	1

23	Doumas, D M, Haustveit, T., & Coll, K. M. (2010). Reducing heavy drinking among first year intercollegiate athletes: A randomized controlled trial of web-based normative feedback. <i>Journal of Applied Sport Psychology</i> , 22 (3), 247–261. https://doi.org/10.1080/10413201003666454	2010	US	1	Alcohol	Students	0	Treatment conditions	Self-report	Yes	3
24	Doumas, Diana M, Ph, D., Workman, C., Smith, D., & Navarro, A. (2011). Reducing high-risk drinking in mandated college students: Evaluation of two personalized normative feedback interventions. <i>Journal of Substance Abuse Treatment</i> , 40 , 376–385. https://doi.org/10.1016/j.jsat.2010.12.006	2011	US	1	Alcohol	Students	0	Treatment conditions	Self-report	Yes	8
25	Flüchter, K., Wortmann, F., & Fleisch, E. (2014). Digital commuting: The effect of social normative feedback on e-bike commuting - Evidence from a field study. In <i>ECIS 2014 Proceedings - 22nd European Conference on Information Systems</i> . ETH Zurich, Zurich, Switzerland. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84905833837&partnerID=40&md5=613751293f919cef661826ea3f2e3eb3	2014	Switzerland	1	Pro-environmental	Employees	0	Treatment conditions	Self-report	Yes	1.25
26	Gidycz, C. A., Orchowski, L. M., & Berkowitz, A. D. (2011). Preventing sexual aggression among college men: An evaluation of a social norms and bystander intervention program. <i>Violence Against Women</i> , 17 (6), 720–742. https://doi.org/10.1177/1077801211409727	2011	US	1	Bullying / harassment behaviour	Students	2	Treatment conditions	Self-report	Yes	7
27	Hallsworth, M., Chadborn, T., Sallis, A., Sanders, M., Berry, D., Greaves, F., ... Davies, S. C. (2016). Provision of social norm feedback to high prescribers of antibiotics in general practice: a pragmatic national randomised controlled trial. <i>The Lancet</i> , 387 , 1743–1752. https://doi.org/10.1016/S0140-6736(16)00215-4	2016	UK	1	Health behaviour	Doctors	3	Treatment conditions	Behaviour recording	Yes	6
28	Hartwell, C. J., & Campion, M. A. (2016). Getting on the same page: The effect of normative feedback interventions on structured interview ratings. <i>Journal of Applied Psychology</i> , 101 (6), 757–778. https://doi.org/10.1037/apl0000099	2016	US	1	Rating of interviews	Employees	0	No control pre-post	Behaviour recording	No	12
29	Hopper, J. R., Nielsen, J. M., & McCarlnielsen, J. (1991). Recycling as altruistic behavior: Normative and Behavioral Strategies to Expand Participation in a Community Recycling Program. <i>Environment and Behavior</i> , 23 (2), 195–220. https://doi.org/10.1177/0013916591232004	1991	US	1	Pro-environmental	Residents	1	Treatment conditions	Behaviour recording	Yes	7
30	Howe, L. C., Carr, P. B., & Walton, G. M. (2017). <i>Normative Appeals Are More Effective When They Invite People to Work Together Toward a Common Cause</i> (Unpublished study information obtained through survey on the 30th October 2017).	Unpublished	US	1	Pro-environmental	Users of public restrooms	0	Treatment conditions	Behaviour recording	Yes	0
31	Kearney, B., Manley, D., & Mendoza, R. (2013). The impact of an alcohol education program using social norming. <i>Kentucky Nurse</i> , 61 (2), 6–7. Retrieved from http://ezproxy.stir.ac.uk/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edo&AN=86919635&site=eds-live	2013	US	1	Alcohol	Students	1	No control pre-post	Self-report	No	1.5
32	Koeneman, M. A., Chorus, A., Hopman-Rock, M., & Chinapaw, M. J. M. (2017). A novel method to promote physical activity among older adults in residential care: An exploratory field study on implicit social norms. <i>BMC Geriatrics</i> , 17 (1). https://doi.org/10.1186/s12877-016-0394-z	2017	Netherlands	1	Health behaviour	Residents	0	Treatment conditions	Self-report	Yes	3
33	Kormos, C., Gifford, R., & Brown, E. (2015). The Influence of Descriptive Social Norm Information on Sustainable Transportation Behavior: A Field Experiment. <i>Environment and Behavior</i> , 47 (5), 479–501. https://doi.org/10.1177/0013916513520416	2015	Canada	1	Pro-environmental	Students	0	Treatment conditions	Self-report	Yes	0.75
34	Kulik, J. A., Butler, H. A., Gerrard, M., Gibbons, F. X., & Mahler, H. I. M. (2008). Social norms information enhances the efficacy of an appearance-based sun protection intervention. <i>Social Science and Medicine</i> , 67 (2), 321–329. https://doi.org/10.1016/j.socscimed.2008.03.037	2008	US	1	Health behaviour	Students	0	Treatment conditions	Self-report	Yes	1

35	Labrie, J. W., Hummer, J. F., Huchting, K. K., & Neighbors, C. (2009). A brief live interactive normative group intervention using wireless keypads to reduce drinking and alcohol consequences in college student athletes. <i>Drug and Alcohol Review</i> , 28 (1), 40–47. https://doi.org/10.1111/j.1465-3362.2008.00012.x	2009	US	1	Alcohol	Students	2	No control pre-post	Self-report	Yes	2
36	Lahlou, S., Boesen-Mariani, S., Franks, B., & Guelinckx, I. (2015). Increasing water intake of children and parents in the family setting: a randomized, controlled intervention using installation theory. <i>Annals of Nutrition and Metabolism</i> , 66 (3), 26–30. https://doi.org/10.1159/000381243	2015	Poland	1	Pro-environmental	Residents	1	Treatment conditions	Behaviour recording	Yes	12
37	Lapinski, M. K., Maloney, E. K., Braz, M., & Shulman, H. C. (2013). Testing the Effects of Social Norms and Behavioral Privacy on Hand Washing: A Field Experiment. <i>Human Communication Research</i> , 39 (1), 21–46. https://doi.org/10.1111/j.1468-2958.2012.01441.x	2013	US	1	Health behaviour	Students	1	Treatment conditions	Behaviour recording	Yes	0
38	Latkin, C., Donnell, D., Liu, T.-Y. T.-Y., Davey-Rothwell, M., Celentano, D., & Metzger, D. (2013). The dynamic relationship between social norms and behaviors: the results of an HIV prevention network intervention for injection drug users. <i>Addiction</i> , 108 (5), 934–943. https://doi.org/10.1111/add.12095	2013	US	1	Sexual health / HIV	Drinkers - drug users	2	Treatment conditions	Self-report	Yes	30
39	Lewis, Melissa A, & Neighbors, C. (2015). An Examination of College Student Activities and Attentiveness During a Web-Delivered Personalized Normative Feedback Intervention. <i>Psychol Addict Behav</i> , 29 (1), 162–167. https://doi.org/10.1038/nbt.3121 .ChIP-nexus	2006	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	3
40	Lewis, M A, Neighbors, C., Lee, C. M., & Oster-Aaland, L. (2008). 21st Birthday Celebratory Drinking: Evaluation of a Personalized Normative Feedback Card Intervention. <i>Psychology of Addictive Behaviors</i> , 22 (2), 176–185. https://doi.org/10.1037/0893-164X.22.2.176	2008	US	1	Alcohol	Students	1	Treatment conditions	Self-report	No	0.2
41	Lewis, M A, Patrick, M. E., Litt, D. M., Atkins, D. C., Kim, T., Blayney, J. A., ... Larimer, M. E. (2014). Randomized controlled trial of a web-delivered personalized normative feedback intervention to reduce alcohol-related risky sexual behavior among college students. <i>Journal of Consulting and Clinical Psychology</i> , 82 (3), 429–440. https://doi.org/10.1037/a0035550	2014	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	6
42	Lojewski, R., Rotunda, R. J., & Arruda, J. E. (2010). Personalized normative feedback to reduce drinking among college students: A social norms intervention examining gender-based versus standard feedback. <i>Journal of Alcohol and Drug Education</i> , 54 (3), 19–40. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-78951472225&partnerID=40&md5=4dc47fad7b9de629f7d6f15af95d40d3	2010	US	1	Alcohol	Students	1	Treatment conditions	Self-report	No	3
43	Mattern, J. L., & Neighbors, C. (2004). Social norms campaigns: Examining the relationship between changes in perceived norms and changes in drinking levels. <i>Journal of Studies on Alcohol</i> , 65 (4), 489–493. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-4143101307&partnerID=40&md5=bfd5e196b2f6fc0fa28f7601305693ab	2004	US	1	Alcohol	Students	1	No control pre-post	Self-report	Yes	1
44	Mccoy, S. I., Fahey, C., Rao, A., Kapologwe, N., Njau, P. F., & Bautista-Arredondo, S. (2017). Pilot study of a multi-pronged intervention using social norms and priming to improve adherence to antiretroviral therapy and retention in care among adults living with HIV in Tanzania. <i>PLoS ONE</i> , 12 (5), 1–15.	2017	Tanzania	1	Sexual health / HIV	Patients	1	Treatment conditions	Behaviour recording	Yes	6
45A	Mockus, A. (2002). Co-existence as harmonization of law, morality and culture. <i>Prospects</i> 2 , XXXII (1), 19–37.	2002	Colombia	2	Pro-environmental behaviour	Residents	3	No control pre-post	Behaviour recording	Yes	N/A
45B					Use of pedestrian crossings	Passers-by	3	No control pre-post	Behaviour recording	Yes	N/A

46	Mogro-Wilson, C., Allen, E., & Cavallucci, C. (2017). A Brief High School Prevention Program to Decrease Alcohol Usage and Change Social Norms. <i>Social Work Research</i> , 41 (1), 53–62. https://doi.org/10.1093/swr/svw023	2017	US	1	Alcohol	Students	3	Treatment conditions	Self-report	Yes	1.25
47	Mollen, S., Rimal, R. N., Ruiter, R. A. C., & Kok, G. (2013). Healthy and unhealthy social norms and food selection. Findings from a field-experiment. <i>Appetite</i> , 65 , 83–89. https://doi.org/10.1016/j.appet.2013.01.020	2013	US	1	Health behaviour	Students	1	Treatment conditions	Behaviour recording	Yes	0
48	Mollen, S., Rimal, R. N., Ruiter, R. A. C., Jang, S. A., & Kok, G. (2013). Intervening or interfering? The influence of injunctive and descriptive norms on intervention behaviours in alcohol consumption contexts. <i>Psychology and Health</i> , 28 (5), 561–578. https://doi.org/10.1080/08870446.2012.752827	2013	Netherlands	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	1
49	Moore, G. F., Williams, A., Moore, L., & Murphy, S. (2013). An exploratory cluster randomised trial of a university halls of residence based social norms marketing campaign to reduce alcohol consumption among 1st year students. <i>Substance Abuse: Treatment, Prevention, and Policy</i> , 8 (1). https://doi.org/10.1186/1747-597X-8-15	2013	UK	1	Alcohol	Students	2	Treatment conditions	Self-report	No	6
50	Moreira, M. T., Oskrochi, R., & Foxcroft, D. R. (2012). Personalised Normative Feedback for Preventing Alcohol Misuse in University Students: Solomon Three-Group Randomised Controlled Trial. <i>PLoS ONE</i> , 7 (9), e44120. https://doi.org/10.1371/journal.pone.0044120	2012	UK	1	Alcohol	Students	3	Treatment conditions	Self-report	No	12
51	Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. <i>Journal of Consulting and Clinical Psychology</i> , 72 (3), 434–447. https://doi.org/10.1037/0022-006X.72.3.434	2004	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	6
52	Neighbors, C., Lewis, M. A., Atkins, D. C., Jensen, M. M., Walter, T., Fossos, N., ... Larimer, M. E. (2010). Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial. <i>Journal of Consulting and Clinical Psychology</i> , 78 (6), 898–911. https://doi.org/10.1037/a0020766	2010	US	1	Alcohol	Students	2	Treatment conditions	Self-report	Yes	24
53	Neighbors, C., Jensen, M., Tidwell, J., Walter, T., Fossos, N., & Lewis, M. A. (2011). Social-norms interventions for light and nondrinking students. <i>Group Processes and Intergroup Relations</i> , 14 (5), 651–669. https://doi.org/10.1177/1368430210398014	2011	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	6
54	Neighbors, C., Rodriguez, L. M., Rinker, D. V., Gonzales, R. G., Agana, M., Tackett, J. L., & Foster, D. W. (2015). Efficacy of personalized normative feedback as a brief intervention for college student gambling: A randomized controlled trial. <i>Journal of Consulting and Clinical Psychology</i> , 83 (3), 500–511. https://doi.org/10.1037/a0039125	2015	US	1	Gambling	Students	1	Treatment conditions	Self-report	Yes	6
55	Neighbors, C., Lewis, M. A., Bergstrom, R. L., & Larimer, M. E. (2006). Being controlled by normative influences: Self-determination as a moderator of a normative feedback alcohol intervention. <i>Health Psychology</i> , 25 (5), 571–579. https://doi.org/10.1037/0278-6133.25.5.571	2006	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	2
56	Paluck, E. L., & Shepherd, H. (2012). The salience of social referents: A field experiment on collective norms and harassment behavior in a school social network. <i>Journal of Personality and Social Psychology</i> , 103 (6), 899–915. https://doi.org/10.1037/a0030015	2012	US	1	Bullying / harassment behaviour	Students	1	Treatment conditions	Behaviour recording	Yes	6
57A	Payne, C. R., Niculescu, M., Just, D. R., & Kelly, M. P. (2015). Shopper marketing nutrition interventions: Social norms on grocery carts increase produce spending without increasing shopper budgets. <i>Preventive Medicine Reports</i> , 2 , 287–291. https://doi.org/10.1016/j.pmedr.2015.04.007	2015	US	2	Health behaviour	Shoppers	3	Treatment conditions	Behaviour recording	Yes	0.5
57B					Health behaviour	Shoppers	3	Treatment conditions	Behaviour recording	Yes	1

58	Pedersen, E. R., Parast, L., Marshall, G. N., Schell, T. L., & Neighbors, C. (2017). A randomized controlled trial of a web-based, personalized normative feedback alcohol intervention for young-adult veterans. <i>Journal of Consulting and Clinical Psychology</i> , 85 (5), 459–470. https://doi.org/10.1037/ccp0000187	2016	US	1	Alcohol	Drinkers - drug users	2	Treatment conditions	Self-report	Yes	1
59	Pellerano, J. A., Price, M. K., Puller, S. L., & Sánchez, G. E. (2016). Do Extrinsic Incentives Undermine Social Norms? Evidence from a Field Experiment in Energy Conservation. <i>Environmental and Resource Economics</i> , 67 (3), 1–16. https://doi.org/10.1007/s10640-016-0094-3	2016	Ecuador	1	Pro-environmental	Residents	3	Treatment conditions	Behaviour recording	Yes	3
60	Perkins, H W, & Craig, D. W. (2006). A successful social norms campaign to reduce alcohol misuse among college student-athletes. <i>Journal of Studies on Alcohol</i> , 67 (6), 880–889. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-33750133994&partnerID=40&md5=5a5509ea95bf5c5920af7e418782c439	2006	US	1	Alcohol	Students	1	No control pre-post	Self-report	Yes	12
61	Perkins, H W, Craig, D. W., & Perkins, J. M. (2011). Using social norms to reduce bullying: A research intervention among adolescents in five middle schools. <i>Group Processes and Intergroup Relations</i> , 14 (5), 703–722. https://doi.org/10.1177/1368430210398004	2011	US	1	Bullying / harassment behaviour	Students	1	No control pre-post	Self-report	Yes	7
62	Perkins, H. Wesley, Linkenbach, J. W., Lewis, M. A., & Neighbors, C. (2010). Effectiveness of social norms media marketing in reducing drinking and driving: A statewide campaign. <i>Addictive Behaviors</i> , 35 (10), 866–874. https://doi.org/10.1016/j.addbeh.2010.05.004	2010	US	1	Alcohol	Residents	1	Treatment conditions	Self-report	Yes	18
63	Pfätheicher, S., Strauch, C., Diefenbacher, S., & Schnuerch, R. (2017). <i>A Field Study on Watching Eyes and Hand Hygiene Compliance in a Public Restroom</i> (Unpublished study information obtained through survey on the 30th October 2017).	Unpublished	Germany	1	Health behaviour	Users of public restrooms	1	Treatment conditions	Behaviour recording	Yes	0
64	Prince, M. A., Maisto, S. A., Rice, S. L., & Carey, K. B. (2015). Development of a Face-to-Face Injunctive Norms Brief Motivational Intervention for College Drinkers and Preliminary Outcomes. <i>Psychology of Addictive Behaviors</i> , 29 (4), 825–835. https://doi.org/10.1037/adb0000118	2015	US	1	Alcohol	Students	0	Treatment conditions	Self-report	Yes	1
65	Reid, A. E., & Aiken, L. S. (2013). Correcting injunctive norm misperceptions motivates behavior change: A randomized controlled sun protection intervention. <i>Health Psychology</i> , 32 (5), 551–560. https://doi.org/10.1037/a0028140	2013	US	1	Health behaviour	Residents	0	Treatment conditions	Self-report	Yes	1
66	Reilly, D. W., & Wood, M. D. (2008). A randomized test of a small-group interactive social norms intervention. <i>Journal of American College Health</i> , 57 (1), 53–60. https://doi.org/10.3200/JACH.57.1.53-60	2008	US	1	Alcohol	Students	2	Treatment conditions	Self-report	No	0.5
67	Ridout, B., & Campbell, A. (2014). Using facebook to deliver a social norm intervention to reduce problem drinking at university. <i>Drug and Alcohol Review</i> , 33 (6), 667–673. https://doi.org/10.1111/dar.12141	2014	Australia	1	Alcohol	Students	0	Treatment conditions	Self-report	Yes	3
68A	Schultz, P. W., & Tyra, A. (2017). <i>Two Field Studies of Normative Beliefs and Environmental Behavior</i> (Unpublished manuscript obtained through email on 30 October 2017).	Unpublished	US	2	Pro-environmental	Residents	2	Treatment conditions	Self-report	No	1
68B					Pro-environmental	Residents	3	Treatment conditions	Behaviour recording	Yes	4
69	Schultz, P. W., Messina, A., Tronu, G., Limas, E. F., Gupta, R., & Estrada, M. (2016). Personalized normative feedback and the moderating role of personal norms: A field experiment to reduce residential water consumption. <i>Environment and Behavior</i> , 48 (5), 686–710. https://doi.org/10.1177/0013916514553835	2016	US	1	Pro-environmental	Residents	2	Treatment conditions	Behaviour recording	Yes	0.25
70	Schultz, P. W., Rendón, T., Göckeritz, S., Hübner, G., Corral-Verdugo, V., & Ando, K. (2017). <i>Normative Social Influence Transcends Culture, But Detecting It Is Culture Specific</i> (Unpublished manuscript obtained through email on 30 October 2017).	Unpublished	Multiple	1	Alcohol	Students	2	Treatment conditions	Self-report	Yes	0
71	Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. <i>Basic and Applied Social Psychology</i> , 21 (1), 25–36. https://doi.org/10.1207/15324839951036533	1999	US	1	Pro-environmental	Residents	2	Treatment conditions	Behaviour recording	Yes	2

72	Scribner, R. A., Theall, K. P., Mason, K., Simonsen, N., Schneider, S. K., Towvim, L. G., & Dejong, W. (2011). Alcohol prevention on college campuses: The moderating effect of the alcohol environment on the effectiveness of social norms marketing campaigns. <i>Journal of Studies on Alcohol and Drugs</i> , 72 (2), 232–239. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-77956726774&partnerID=40&md5=377bb52b904cc21b42d60ce8217e4b51	2011	US	1	Alcohol	Students	3	Treatment conditions	Self-report	Yes	48
73	Silk, K. J., Perrault, E. K., Nazione, S. A., Pace, K., & Collins-Eaglin, J. (2017). Evaluation of a Social Norms Approach to a Suicide Prevention Campaign. <i>Journal of Health Communication</i> , 22 (2), 135–142. https://doi.org/10.1080/10810730.2016.1258742	2017	US	1	Counselling service use	Students	1	Treatment conditions	Self-report	Yes	3
74	Smith, S. W., Atkin, C. K., Martell, D., Allen, R., & Hembroff, L. (2006). A social judgment theory approach to conducting formative research in a social norms campaign. <i>Communication Theory</i> , 16 (1), 141–152. https://doi.org/10.1111/j.1468-2885.2006.00009.x	2006	US	1	Alcohol	Students	3	No control pre-post	Self-report	Yes	24
75	Spijkerman, R., Roek, M. A. E., Vermulst, A., Lemmers, L., Huiberts, A., & Engels, R. C. M. E. R. C. M. E. (2010). Effectiveness of a Web-based brief alcohol intervention and added value of normative feedback in reducing underage drinking: A randomized controlled trial. <i>Journal of Medical Internet Research</i> , 12 (5), 1–14. https://doi.org/10.2196/jmir.1465	2010	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	3
76	Stamper, G. A., Smith, B. H., Gant, R., & Bogle, K. E. (2004). Replicated findings of an evaluation of a brief intervention designed to prevent high-risk drinking among first-year college students: Implications for social norming theory. <i>Journal of Alcohol and Drug Education</i> , 48 (2), 53–72. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-13244259379&partnerID=40&md5=d6cbaae50492e8d676dff2a74b295ca3	2004	US	1	Alcohol	Students	3	Treatment conditions	Self-report	No	1
77	Steffian, G. (1999). <i>Correction of normative misperceptions: An alcohol abuse prevention program</i> . <i>Journal of Drug Education</i> . https://doi.org/10.2190/9XXK-BM6K-N28X-3FTL	1998	US	1	Alcohol	Students	0	Treatment conditions	Self-report	No	1
78	Su, J., Hancock, L., Wattenmaker McGann, A., Alshagra, M., Ericson, R., Niazi, Z., ... Adkins, A. (2017). Evaluating the Effect of a Campus-wide Social Norms Marketing Intervention on Alcohol Use Perceptions, Consumption, and Blackouts. <i>Journal of American College Health , Online Adv</i> . https://doi.org/10.1080/07448481.2017.1382500	2017	US	1	Alcohol	Students	3	No control pre-post	Self-report	Yes	48
79	Taylor, M. J., Vlaev, I., Maltby, J., Brown, G. D. A., & Wood, A. M. (2015). Improving social norms interventions: Rank-framing increases excessive alcohol drinkers' information-seeking. <i>Health Psychology</i> , 34 (12), 1200–1203. https://doi.org/10.1037/hea0000237	2015	UK	1	Alcohol	Students	0	Treatment conditions	Self-report	Yes	1
80	Thombs, D. L., Olds, R. S., Osborn, C. J., Casseday, S., Glavin, K., & Berkowitz, A. D. (2007). Outcomes of a technology-based social norms intervention to deter alcohol use in freshman residence halls. <i>Journal of American College Health</i> , 55 (6), 325–332. https://doi.org/10.3200/JACH.55.6.325-332	2007	US	1	Alcohol	Students	1	Treatment conditions	Behaviour recording	No	20
81	Thombs, D. L., Dotterer, S., Olds, R. S., Sharp, K. E., & Raub, C. G. (2004). A close look at why one social norms campaign did not reduce student drinking. <i>Journal of American College Health</i> , 53 (2), 61–68. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-4944234965&partnerID=40&md5=5d8cc7a1057da19d1e180558368a3ed2	2004	US	1	Alcohol	Students	2	No control pre-post	Self-report	No	36
82	Thorndike, A. N., Riis, J., & Levy, D. E. (2016). Social norms and financial incentives to promote employees' healthy food choices: A randomized controlled trial. <i>Preventive Medicine</i> , 86 , 12–18. https://doi.org/10.1016/j.ypmed.2016.01.017	2016	US	1	Health behaviour	Employees	3	Treatment conditions	Behaviour recording	Yes	6

83	Toghianifar, N., Sarrafzadegan, N., & Gharipour, M. (2014). Women's attitude toward smoking: effect of a community-based intervention on smoking-related social norms. <i>Int J Evid Based Healthc</i> . https://doi.org/10.1097/XEB.0000000000000012	2014	Iran	1	Health behaviour	Residents	3	Treatment conditions	Self-report	Yes	36
84	Turner, J., Perkins, H. W., & Bauerle, J. (2008). Declining negative consequences related to alcohol misuse among students exposed to a social norms marketing intervention on a college campus. <i>Journal of American College Health</i> , 57 (1), 85–93. https://doi.org/10.3200/JACH.57.1.85-94	2008	US	1	Alcohol	Students	3	No control pre-post	Self-report	Yes	72
85	Wally, C. M., & Cameron, L. D. (2017). A Randomized-Controlled Trial of Social Norm Interventions to Increase Physical Activity. <i>Annals of Behavioral Medicine</i> . Psychological Sciences, University of California, Merced, 5200 N. Lake Road, Merced, CA, United States. https://doi.org/10.1007/s12160-017-9887-z	2017	US	1	Health behaviour	Students	0	Treatment conditions	Behaviour recording	Yes	0.27
86	Wegs, C., Creanga, A. A., Galavotti, C., & Wamalwa, E. (2016). Community Dialogue to Shift Social Norms and Enable Family Planning: An Evaluation of the Family Planning Results Initiative in Kenya. <i>PloS One</i> , 11 (4), e0153907. https://doi.org/10.1371/journal.pone.0153907	2016	Kenya	1	Sexual health / HIV	Residents	2	No control pre-post	Self-report	Yes	41
87	Wenzel, M. (2005). Misperceptions of social norms about tax compliance: From theory to intervention. <i>Journal of Economic Psychology</i> , 26 (6), 862–883. https://doi.org/10.1016/j.joep.2005.02.002	2005	Australia	1	Tax and retirement	Taxpayers	3	Treatment conditions	Behaviour recording	Yes	2
88	Werch, C. E., Pappas, D. M., Carlson, J. M., DiClemente, C. C., Chally, P. S., & Sinder, J. A. (2000). Results of a social norm intervention to prevent binge drinking among first-year residential college students. <i>Journal of American College Health</i> , 49 (2), 85–92. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0034267171&partnerID=40&md5=6295e50f7e805e1fbfa5c3c42bcbeca0	2000	US	1	Alcohol	Students	2	Treatment conditions	Self-report	No	6
89	Yurasek, A. M., Borsari, B., Magill, M., Mastroleo, N. R., Hustad, J. T. P., O'Leary Tevyaw, T., ... Monti, P. M. (2015). Descriptive Norms and Expectancies as Mediators of a Brief Motivational Intervention for Mandated College Students Receiving Stepped Care for Alcohol Use. <i>Psychology of Addictive Behaviors</i> , 29 (4), 1003–1011. https://doi.org/10.1037/adb0000092	2015	US	1	Alcohol	Students	1	Treatment conditions	Self-report	Yes	9

Annex 6. Complete list of coded studies - B. Strategies

Using social norms to change behavior and increase sustainability in the real world: a systematic review of the literature

S1. Full coded set

3		STRATEGIES			
No.	Reference	In-situ	Remote	GSI	EBO
1	Agha, S., & Van Rossem, R. (2004). Impact of a school-based peer sexual health intervention on normative beliefs, risk perceptions, and sexual behavior of Zambian adolescents. <i>Journal of Adolescent Health</i> , 34 (5), 441–452. https://doi.org/10.1016/j.jadohealth.2003.07.016	0	1	0	1
2	Balvig, F., & Holmberg, L. (2011). The ripple effect: A randomized trial of a social norms intervention in a Danish middle school setting. <i>Journal of Scandinavian Studies in Criminology and Crime Prevention</i> , 12 (1), 3–19. https://doi.org/10.1080/14043858.2011.561619	0	1	1	1
3	Bateson, M., Callow, L., Holmes, J. R., Redmond Roche, M. L., & Nettle, D. (2013). Do images of “watching eyes” induce behaviour that is more pro-social or more normative? A field experiment on littering. <i>PLoS ONE</i> , 8 (12), 1–9. https://doi.org/10.1371/journal.pone.0082055	1	0	0	0
4	Bauer, R., Eberhardt, I., & Smeets, P. (2017). Financial Incentives Beat Social Norms : A Field Experiment on Retirement Information Search. <i>SSRN Electronic Journal</i> . Retrieved from https://ssrn.com/abstract=3023943	1	0	1	0
5	Bertholet, N., Daeppen, J.-B., Cunningham, J. A., Burnand, B., Gmel, G., & Gaume, J. (2016). Are young men who overestimate drinking by others more likely to respond to an electronic normative feedback brief intervention for unhealthy alcohol use? <i>Addictive Behaviors</i> , 63 , 97–101. https://doi.org/10.1016/j.addbeh.2016.07.015	0	1	1	0
6	Bewick, B. M., West, R. M., Barkham, M., Mulhern, B., Marlow, R., Traviss, G., & Hill, A. J. (2013). The effectiveness of a Web-based personalized feedback and social norms alcohol intervention on United Kingdom university students: Randomized controlled trial. <i>Journal of Medical Internet Research</i> , 15 (7), 1–10. https://doi.org/10.2196/jmir.2581	0	1	1	0
7	Bewick, B. M., Trusler, K., Mulhern, B., Barkham, M., & Hill, A. J. (2008). The feasibility and effectiveness of a web-based personalised feedback and social norms alcohol intervention in UK university students: A randomised control trial. <i>Addictive Behaviors</i> , 33 (9), 1192–1198. https://doi.org/10.1016/j.addbeh.2008.05.002	0	1	1	0

8	Boen, F., Van Hoecke, A.-S., Smits, T., Hurkmans, E., Fransen, K., & Seghers, J. (2017). <i>Portraying role models to promote stair climbing in a public setting: The effect of matching sex and age</i> (Unpublished manuscript obtained through email on 30 October 2017).	1	0	1	0
9	Boyle, S. C., Earle, A. M., LaBrie, J. W., & Smith, D. J. (2017). PNF 2.0? Initial evidence that gamification can increase the efficacy of brief, web-based personalized normative feedback alcohol interventions. <i>Addictive Behaviors</i> , 67 , 8–17. https://doi.org/10.1016/j.addbeh.2016.11.024	0	1	1	0
10	Brent, D. A., Lott, C., Taylor, M., Cook, J., Rollins, K., Stoddard, S., ... Cook, J. (2017). <i>Are Normative Appeals Moral Taxes? Evidence from A Field Experiment on Water Conservation</i> (Working paper 2017-07 - Department of Economics, Louisiana State University). Retrieved from http://faculty.bus.lsu.edu/workingpapers/pap17_07.pdf	1	0	1	0
11	Bruce, S., & Keller, A. (2007). Applying Social Norms Theory within groups: Promising for high-risk drinking. <i>NASPA Journal</i> , 44 (1), 101–122. https://doi.org/10.2202/1949-6605.1757	0	1	1	1
12	Brudermann, T., Bartel, G., Fenzl, T., & Seebauer, S. (2015). Eyes on social norms: A field study on an honor system for newspaper sale. <i>Theory and Decision</i> , 79 (2), 285–306. https://doi.org/10.1007/s11238-014-9460-1	1	0	1	0
13	Celio, M. A., & Lisman, S. A. (2014). Examining the efficacy of a personalized normative feedback intervention to reduce college student gambling. <i>Journal of American College Health</i> , 62 (3), 154–164. https://doi.org/10.1080/07448481.2013.865626	0	1	1	0
14	Chernoff, R. A., & Davison, G. C. (2005). An evaluation of a brief HIV/AIDS prevention intervention for college students using normative feedback and goal setting. <i>AIDS Education and Prevention</i> , 17 (2), 91–104. https://doi.org/10.1521/aeap.17.3.91.62902	0	1	1	0
15	Cleveland, M. J., Hultgren, B., Varvil-Weld, L., Mallett, K. A., Turrisi, R., & Abar, C. C. (2013). Moderation of a parent-based intervention on transitions in drinking: Examining the role of normative perceptions and attitudes among high- and low-risk first-year college students. <i>Alcoholism: Clinical and Experimental Research</i> , 37 (9), 1587–1594. https://doi.org/10.1111/acer.12126	0	1	1	0

16	Collins, S. E., Carey, K. B., & Sliwinski, M. J. (2002). Mailed personalized normative feedback as a brief intervention for at-risk college drinkers. <i>Journal of Studies on Alcohol</i> , 63 (5), 559–567. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0036746433&partnerID=40&md5=4a617da60cac5b68e34feac68dfe404b	0	1	1	0
17	Collins, S. E., Kirouac, M., Lewis, M. A., Witkiewitz, K., & Carey, K. B. (2014). Randomized controlled trial of web-based decisional balance feedback and personalized normative feedback for college drinkers. <i>Journal of Studies on Alcohol and Drugs</i> , 75 (6), 982–992.	0	1	1	0
18	Cross, J. E., & Peisner, W. (2009). RECOGNIZE: A social norms campaign to reduce rumor spreading in a junior high school. <i>Professional School Counseling</i> , 12 (5), 365–377. https://doi.org/10.5330/PSC.n.2010-12.365	1	0	1	1
19	Cunningham, J. A., & Wong, H. T. A. (2013). Assessing the immediate impact of normative drinking information using an immediate post-test randomized controlled design: Implications for normative feedback interventions? <i>Addictive Behaviors</i> , 38 (6), 2252–2256. https://doi.org/10.1016/j.addbeh.2013.02.005	0	1	1	0
20	Davis, J. P., Houck, J. M., Rowell, L. N., Benson, J. G., & Smith, D. C. (2016). Brief Motivational Interviewing and Normative Feedback for Adolescents: Change Language and Alcohol Use Outcomes. <i>Journal of Substance Abuse Treatment</i> , 65 , 66–73. https://doi.org/10.1016/j.jsat.2015.10.004	0	1	1	1
21	Dejong, W., Schneider, S. K., Towvim, L. G., Murphy, M. J., Doerr, E. E., Simonsen, N. R., ... Scribner, R. A. (2009). A multisite randomized trial of social norms marketing campaigns to reduce college student drinking: A replication failure. <i>Substance Abuse</i> , 30 (2), 127–140. https://doi.org/10.1080/08897070902802059	1	1	1	0
22	Doumas, D M, & Hannah, E. (2008). Preventing high-risk drinking in youth in the workplace: A web-based normative feedback program <i>Journal of Substance Abuse Treatment</i> , 34 (3), 263–271. https://doi.org/10.1016/j.jsat.2007.04.006	0	1	1	1
23	Doumas, D M, Haustveit, T., & Coll, K. M. (2010). Reducing heavy drinking among first year intercollegiate athletes: A randomized controlled trial of web-based normative feedback. <i>Journal of Applied Sport Psychology</i> , 22 (3), 247–261. https://doi.org/10.1080/10413201003666454	0	1	1	1

24	Doumas, Diana M, Ph, D., Workman, C., Smith, D., & Navarro, A. (2011). Reducing high-risk drinking in mandated college students: Evaluation of two personalized normative feedback interventions. <i>Journal of Substance Abuse Treatment</i> , 40 , 376–385. https://doi.org/10.1016/j.jsat.2010.12.006	0	1	1	1
25	Flüchter, K., Wortmann, F., & Fleisch, E. (2014). Digital commuting: The effect of social normative feedback on e-bike commuting - Evidence from a field study. In <i>ECIS 2014 Proceedings - 22nd European Conference on Information Systems</i> . ETH Zurich, Zurich, Switzerland. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84905833837&partnerID=40&md5=613751293f919cef661826ea3f2e3eb3	1	1	1	0
26	Gidycz, C. A., Orchowski, L. M., & Berkowitz, A. D. (2011). Preventing sexual aggression among college men: An evaluation of a social norms and bystander intervention program. <i>Violence Against Women</i> , 17 (6), 720–742. https://doi.org/10.1177/1077801211409727	0	1	1	1
27	Hallsworth, M., Chadborn, T., Sallis, A., Sanders, M., Berry, D., Greaves, F., ... Davies, S. C. (2016). Provision of social norm feedback to high prescribers of antibiotics in general practice: a pragmatic national randomised controlled trial. <i>The Lancet</i> , 387 , 1743–1752. https://doi.org/10.1016/S0140-6736(16)00215-4	1	0	1	0
28	Hartwell, C. J., & Campion, M. A. (2016). Getting on the same page: The effect of normative feedback interventions on structured interview ratings. <i>Journal of Applied Psychology</i> , 101 (6), 757–778. https://doi.org/10.1037/apl0000099	0	1	1	0
29	Hopper, J. R., Nielsen, J. M., & McCarl Nielsen, J. (1991). Recycling as altruistic behavior: Normative and Behavioral Strategies to Expand Participation in a Community Recycling Program. <i>Environment and Behavior</i> , 23 (2), 195–220. https://doi.org/10.1177/0013916591232004	1	0	0	1
30	Howe, L. C., Carr, P. B., & Walton, G. M. (2017). <i>Normative Appeals Are More Effective When They Invite People to Work Together Toward a Common Cause</i> (Unpublished study information obtained through survey on the 30th October 2017).	1	0	1	0
31	Kearney, B., Manley, D., & Mendoza, R. (2013). The impact of an alcohol education program using social norming. <i>Kentucky Nurse</i> , 61 (2), 6–7. Retrieved from http://ezproxy.stir.ac.uk/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edo&AN=86919635&site=eds-live	0	1	1	1

32	Koeneman, M. A., Chorus, A., Hopman-Rock, M., & Chinapaw, M. J. M. (2017). A novel method to promote physical activity among older adults in residential care: An exploratory field study on implicit social norms. <i>BMC Geriatrics</i> , 17 (1). https://doi.org/10.1186/s12877-016-0394-z	0	1	0	1
33	Kormos, C., Gifford, R., & Brown, E. (2015). The Influence of Descriptive Social Norm Information on Sustainable Transportation Behavior: A Field Experiment. <i>Environment and Behavior</i> , 47 (5), 479–501. https://doi.org/10.1177/0013916513520416	0	1	1	0
34	Kulik, J. A., Butler, H. A., Gerrard, M., Gibbons, F. X., & Mahler, H. I. M. (2008). Social norms information enhances the efficacy of an appearance-based sun protection intervention. <i>Social Science and Medicine</i> , 67 (2), 321–329. https://doi.org/10.1016/j.socscimed.2008.03.037	0	1	1	0
35	Labrie, J. W., Hummer, J. F., Huchting, K. K., & Neighbors, C. (2009). A brief live interactive normative group intervention using wireless keypads to reduce drinking and alcohol consequences in college student athletes. <i>Drug and Alcohol Review</i> , 28 (1), 40–47. https://doi.org/10.1111/j.1465-3362.2008.00012.x	0	1	1	0
36	Lahlou, S., Boesen-Mariani, S., Franks, B., & Guelinckx, I. (2015). Increasing water intake of children and parents in the family setting: a randomized, controlled intervention using installation theory. <i>Annals of Nutrition and Metabolism</i> , 66 (3), 26–30. https://doi.org/10.1159/000381243	1	0	0	1
37	Lapinski, M. K., Maloney, E. K., Braz, M., & Shulman, H. C. (2013). Testing the Effects of Social Norms and Behavioral Privacy on Hand Washing: A Field Experiment. <i>Human Communication Research</i> , 39 (1), 21–46. https://doi.org/10.1111/j.1468-2958.2012.01441.x	1	0	0	1
38	Latkin, C., Donnell, D., Liu, T.-Y. T.-Y., Davey-Rothwell, M., Celentano, D., & Metzger, D. (2013). The dynamic relationship between social norms and behaviors: the results of an HIV prevention network intervention for injection drug users. <i>Addiction</i> , 108 (5), 934–943. https://doi.org/10.1111/add.12095	0	1	0	1
39	Lewis, Melissa A, & Neighbors, C. (2015). An Examination of College Student Activities and Attentiveness During a Web-Delivered Personalized Normative Feedback Intervention. <i>Psychol Addict Behav</i> , 29 (1), 162–167. https://doi.org/10.1038/nbt.3121 .ChIP-nexus	0	1	1	0

40	Lewis, M A, Neighbors, C., Lee, C. M., & Oster-Aaland, L. (2008). 21st Birthday Celebratory Drinking: Evaluation of a Personalized Normative Feedback Card Intervention. <i>Psychology of Addictive Behaviors</i> , 22 (2), 176–185. https://doi.org/10.1037/0893-164X.22.2.176	0	1	1	0
41	Lewis, M A, Patrick, M. E., Litt, D. M., Atkins, D. C., Kim, T., Blayney, J. A., ... Larimer, M. E. (2014). Randomized controlled trial of a web-delivered personalized normative feedback intervention to reduce alcohol-related risky sexual behavior among college students. <i>Journal of Consulting and Clinical Psychology</i> , 82 (3), 429–440. https://doi.org/10.1037/a0035550	0	1	1	0
42	Lojewski, R., Rotunda, R. J., & Arruda, J. E. (2010). Personalized normative feedback to reduce drinking among college students: A social norms intervention examining gender-based versus standard feedback <i>Journal of Alcohol and Drug Education</i> , 54 (3), 19–40. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-78951472225&partnerID=40&md5=4dc47fad7b9de629f7d6f15af95d40d3	0	1	1	0
43	Mattern, J. L., & Neighbors, C. (2004). Social norms campaigns: Examining the relationship between changes in perceived norms and changes in drinking levels. <i>Journal of Studies on Alcohol</i> , 65 (4), 489–493. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-4143101307&partnerID=40&md5=bfd5e196b2f6fc0fa28f7601305693ab	1	1	1	0
44	Mccoy, S. I., Fahey, C., Rao, A., Kapologwe, N., Njau, P. F., & Bautista-Arredondo, S. (2017). Pilot study of a multi-pronged intervention using social norms and priming to improve adherence to antiretroviral therapy and retention in care among adults living with HIV in Tanzania. <i>PLoS ONE</i> , 12 (5), 1–15.	1	0	0	1
45A	Mockus, A. (2002). Co-existence as harmonization of law, morality and culture. <i>Prospects2</i> , XXXII (1), 19–37.	1	0	1	1
45B		1	1	0	1
46	Mogro-Wilson, C., Allen, E., & Cavallucci, C. (2017). A Brief High School Prevention Program to Decrease Alcohol Usage and Change Social Norms. <i>Social Work Research</i> , 41 (1), 53–62. https://doi.org/10.1093/swr/svw023	0	1	1	1

47	Mollen, S., Rimal, R. N., Ruiter, R. A. C., & Kok, G. (2013). Healthy and unhealthy social norms and food selection. Findings from a field-experiment. <i>Appetite</i> , 65 , 83–89. https://doi.org/10.1016/j.appet.2013.01.020	1	0	1	0
48	Mollen, S., Rimal, R. N., Ruiter, R. A. C., Jang, S. A., & Kok, G. (2013). Intervening or interfering? The influence of injunctive and descriptive norms on intervention behaviours in alcohol consumption contexts. <i>Psychology and Health</i> , 28 (5), 561–578. https://doi.org/10.1080/08870446.2012.752827	0	1	1	0
49	Moore, G. F., Williams, A., Moore, L., & Murphy, S. (2013). An exploratory cluster randomised trial of a university halls of residence based social norms marketing campaign to reduce alcohol consumption among 1st year students. <i>Substance Abuse: Treatment, Prevention, and Policy</i> , 8 (1). https://doi.org/10.1186/1747-597X-8-15	1	1	1	0
50	Moreira, M. T., Oskrochi, R., & Foxcroft, D. R. (2012). Personalised Normative Feedback for Preventing Alcohol Misuse in University Students: Solomon Three-Group Randomised Controlled Trial. <i>PLoS ONE</i> , 7 (9), e44120. https://doi.org/10.1371/journal.pone.0044120	0	1	1	0
51	Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. <i>Journal of Consulting and Clinical Psychology</i> , 72 (3), 434–447. https://doi.org/10.1037/0022-006X.72.3.434	0	1	1	0
52	Neighbors, C., Lewis, M. A., Atkins, D. C., Jensen, M. M., Walter, T., Fossos, N., ... Larimer, M. E. (2010). Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial. <i>Journal of Consulting and Clinical Psychology</i> , 78 (6), 898–911. https://doi.org/10.1037/a0020766	0	1	1	0
53	Neighbors, C., Jensen, M., Tidwell, J., Walter, T., Fossos, N., & Lewis, M. A. (2011). Social-norms interventions for light and nondrinking students. <i>Group Processes and Intergroup Relations</i> , 14 (5), 651–669. https://doi.org/10.1177/1368430210398014	0	1	1	0
54	Neighbors, C., Rodriguez, L. M., Rinker, D. V, Gonzales, R. G., Agana, M., Tackett, J. L., & Foster, D. W. (2015). Efficacy of personalized normative feedback as a brief intervention for college student gambling: A randomized controlled trial. <i>Journal of Consulting and Clinical Psychology</i> , 83 (3), 500–511. https://doi.org/10.1037/a0039125	0	1	1	0

55	Neighbors, C., Lewis, M. A., Bergstrom, R. L., & Larimer, M. E. (2006). Being controlled by normative influences: Self-determination as a moderator of a normative feedback alcohol intervention. <i>Health Psychology</i> , 25 (5), 571–579. https://doi.org/10.1037/0278-6133.25.5.571	0	1	1	0
56	Paluck, E. L., & Shepherd, H. (2012). The salience of social referents: A field experiment on collective norms and harassment behavior in a school social network. <i>Journal of Personality and Social Psychology</i> , 103 (6), 899–915. https://doi.org/10.1037/a0030015	1	0	1	1
57A	Payne, C. R., Niculescu, M., Just, D. R., & Kelly, M. P. (2015). Shopper marketing nutrition interventions: Social norms on grocery carts increase produce spending without increasing shopper budgets. <i>Preventive Medicine Reports</i> , 2 , 287–291.	1	0	1	0
57B	https://doi.org/10.1016/j.pmedr.2015.04.007	1	0	1	0
58	Pedersen, E. R., Parast, L., Marshall, G. N., Schell, T. L., & Neighbors, C. (2017). A randomized controlled trial of a web-based, personalized normative feedback alcohol intervention for young-adult veterans. <i>Journal of Consulting and Clinical Psychology</i> , 85 (5), 459–470. https://doi.org/10.1037/ccp0000187	0	1	1	0
59	Pellerano, J. A., Price, M. K., Puller, S. L., & Sánchez, G. E. (2016). Do Extrinsic Incentives Undermine Social Norms? Evidence from a Field Experiment in Energy Conservation. <i>Environmental and Resource Economics</i> , 67 (3), 1–16. https://doi.org/10.1007/s10640-016-0094-3	1	0	1	0
60	Perkins, H W, & Craig, D. W. (2006). A successful social norms campaign to reduce alcohol misuse among college student-athletes. <i>Journal of Studies on Alcohol</i> , 67 (6), 880–889. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-33750133994&partnerID=40&md5=5a5509ea95bf5c5920af7e418782c439	1	1	1	1
61	Perkins, H W, Craig, D. W., & Perkins, J. M. (2011). Using social norms to reduce bullying: A research intervention among adolescents in five middle schools. <i>Group Processes and Intergroup Relations</i> , 14 (5), 703–722. https://doi.org/10.1177/1368430210398004	1	0	1	0
62	Perkins, H. Wesley, Linkenbach, J. W., Lewis, M. A., & Neighbors, C. (2010). Effectiveness of social norms media marketing in reducing drinking and driving: A statewide campaign. <i>Addictive Behaviors</i> , 35 (10), 866–874. https://doi.org/10.1016/j.addbeh.2010.05.004	1	1	1	1

63	Pfattheicher, S., Strauch, C., Diefenbacher, S., & Schnuerch, R. (2017). <i>A Field Study on Watching Eyes and Hand Hygiene Compliance in a Public Restroom</i> (Unpublished study information obtained through survey on the 30th October 2017).	1	0	0	0
64	Prince, M. A., Maisto, S. A., Rice, S. L., & Carey, K. B. (2015). Development of a Face-to-Face Injunctive Norms Brief Motivational Intervention for College Drinkers and Preliminary Outcomes. <i>Psychology of Addictive Behaviors</i> , 29 (4), 825–835. https://doi.org/10.1037/adb0000118	0	1	1	0
65	Reid, A. E., & Aiken, L. S. (2013). Correcting injunctive norm misperceptions motivates behavior change: A randomized controlled sun protection intervention. <i>Health Psychology</i> , 32 (5), 551–560. https://doi.org/10.1037/a0028140	0	1	1	0
66	Reilly, D. W., & Wood, M. D. (2008). A randomized test of a small-group interactive social norms intervention. <i>Journal of American College Health</i> , 57 (1), 53–60. https://doi.org/10.3200/JACH.57.1.53-60	0	1	1	1
67	Ridout, B., & Campbell, A. (2014). Using facebook to deliver a social norm intervention to reduce problem drinking at university. <i>Drug and Alcohol Review</i> , 33 (6), 667–673. https://doi.org/10.1111/dar.12141	0	1	1	0
68A	Schultz, P. W., & Tyra, A. (2017). <i>Two Field Studies of Normative Beliefs and Environmental Behavior</i> (Unpublished manuscript obtained through email on 30 October 2017).	1	0	1	0
68B		1	0	1	0
69	Schultz, P. W., Messina, A., Tronu, G., Limas, E. F., Gupta, R., & Estrada, M. (2016). Personalized normative feedback and the moderating role of personal norms: A field experiment to reduce residential water consumption. <i>Environment and Behavior</i> , 48 (5), 686–710. https://doi.org/10.1177/0013916514553835	1	0	1	0
70	Schultz, P. W., Rendón, T., Göckeritz, S., Hübner, G., Corral-Verdugo, V., & Ando, K. (2017). <i>Normative Social Influence Transcends Culture, But Detecting It Is Culture Specific</i> (Unpublished manuscript obtained through email on 30 October 2017).	0	1	1	0
71	Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. <i>Basic and Applied Social Psychology</i> , 21 (1), 25–36. https://doi.org/10.1207/15324839951036533	1	0	1	0

72	Scribner, R. A., Theall, K. P., Mason, K., Simonsen, N., Schneider, S. K., Towvim, L. G., & Dejong, W. (2011). Alcohol prevention on college campuses: The moderating effect of the alcohol environment on the effectiveness of social norms marketing campaigns. <i>Journal of Studies on Alcohol and Drugs</i> , 72 (2), 232–239. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-77956726774&partnerID=40&md5=377bb52b904cc21b42d60ce8217e4b51	1	1	1	0
73	Silk, K. J., Perrault, E. K., Nazione, S. A., Pace, K., & Collins-Eaglin, J. (2017). Evaluation of a Social Norms Approach to a Suicide Prevention Campaign. <i>Journal of Health Communication</i> , 22 (2), 135–142. https://doi.org/10.1080/10810730.2016.1258742	1	0	1	0
74	Smith, S. W., Atkin, C. K., Martell, D., Allen, R., & Hembroff, L. (2006). A social judgment theory approach to conducting formative research in a social norms campaign. <i>Communication Theory</i> , 16 (1), 141–152. https://doi.org/10.1111/j.1468-2885.2006.00009.x	1	1	1	0
75	Spijkerman, R., Roek, M. A. E., Vermulst, A., Lemmers, L., Huiberts, A., & Engels, R. C. M. E. R. C. M. E. (2010). Effectiveness of a Web-based brief alcohol intervention and added value of normative feedback in reducing underage drinking: A randomized controlled trial. <i>Journal of Medical Internet Research</i> , 12 (5), 1–14. https://doi.org/10.2196/jmir.1465	0	1	1	0
76	Stamper, G. A., Smith, B. H., Gant, R., & Bogle, K. E. (2004). Replicated findings of an evaluation of a brief intervention designed to prevent high-risk drinking among first-year college students: Implications for social norming theory. <i>Journal of Alcohol and Drug Education</i> , 48 (2), 53–72. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-13244259379&partnerID=40&md5=d6cbaae50492e8d676dff2a74b295ca3	0	1	1	1
77	Steffian, G. (1999). <i>Correction of normative misperceptions: An alcohol abuse prevention program</i> . <i>Journal of Drug Education</i> . https://doi.org/10.2190/9XKX-BM6K-N28X-3FTL	0	1	1	1
78	Su, J., Hancock, L., Wattenmaker McGann, A., Alshagra, M., Ericson, R., Niazi, Z., ... Adkins, A. (2017). Evaluating the Effect of a Campus-wide Social Norms Marketing Intervention on Alcohol Use Perceptions, Consumption, and Blackouts. <i>Journal of American College Health</i> , Online Adv . https://doi.org/10.1080/07448481.2017.1382500	0	1	1	0

79	Taylor, M. J., Vlaev, I., Maltby, J., Brown, G. D. A., & Wood, A. M. (2015). Improving social norms interventions: Rank-framing increases excessive alcohol drinkers' information-seeking. <i>Health Psychology</i> , 34 (12), 1200–1203. https://doi.org/10.1037/hea0000237	0	1	1	0
80	Thombs, D. L., Olds, R. S., Osborn, C. J., Casseday, S., Glavin, K., & Berkowitz, A. D. (2007). Outcomes of a technology-based social norms intervention to deter alcohol use in freshman residence halls. <i>Journal of American College Health</i> , 55 (6), 325–332. https://doi.org/10.3200/JACH.55.6.325-332	0	1	1	0
81	Thombs, D. L., Dotterer, S., Olds, R. S., Sharp, K. E., & Raub, C. G. (2004). A close look at why one social norms campaign did not reduce student drinking. <i>Journal of American College Health</i> , 53 (2), 61–68. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-4944234965&partnerID=40&md5=5d8cc7a1057da19d1e180558368a3ed2	1	1	1	1
82	Thorndike, A. N., Riis, J., & Levy, D. E. (2016). Social norms and financial incentives to promote employees' healthy food choices: A randomized controlled trial. <i>Preventive Medicine</i> , 86 , 12–18. https://doi.org/10.1016/j.ypmed.2016.01.017	0	1	1	0
83	Toghianifar, N., Sarrafzadegan, N., & Gharipour, M. (2014). Women's attitude toward smoking: effect of a community-based intervention on smoking-related social norms. <i>Int J Evid Based Healthc</i> . https://doi.org/10.1097/XEB.0000000000000012	1	1	1	1
84	Turner, J., Perkins, H. W., & Bauerle, J. (2008). Declining negative consequences related to alcohol misuse among students exposed to a social norms marketing intervention on a college campus. <i>Journal of American College Health</i> , 57 (1), 85–93. https://doi.org/10.3200/JACH.57.1.85-94	1	1	1	1
85	Wally, C. M., & Cameron, L. D. (2017). A Randomized-Controlled Trial of Social Norm Interventions to Increase Physical Activity. <i>Annals of Behavioral Medicine</i> . Psychological Sciences, University of California, Merced, 5200 N. Lake Road, Merced, CA, United States. https://doi.org/10.1007/s12160-017-9887-z	0	1	1	0
86	Wegs, C., Creanga, A. A., Galavotti, C., & Wamalwa, E. (2016). Community Dialogue to Shift Social Norms and Enable Family Planning: An Evaluation of the Family Planning Results Initiative in Kenya. <i>PloS One</i> , 11 (4), e0153907. https://doi.org/10.1371/journal.pone.0153907	0	1	1	1

87	Wenzel, M. (2005). Misperceptions of social norms about tax compliance: From theory to intervention. <i>Journal of Economic Psychology</i> , 26 (6), 862–883. https://doi.org/10.1016/j.joep.2005.02.002	1	0	1	0
88	Werch, C. E., Pappas, D. M., Carlson, J. M., DiClemente, C. C., Chally, P. S., & Sinder, J. A. (2000). Results of a social norm intervention to prevent binge drinking among first-year residential college students. <i>Journal of American College Health</i> , 49 (2), 85–92. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0034267171&partnerID=40&md5=6295e50f7e805e1fbfa5c3c42bcbeca0	1	1	1	0
89	Yurasek, A. M., Borsari, B., Magill, M., Mastroleo, N. R., Hustad, J. T. P., O’Leary Tevyaw, T., ... Monti, P. M. (2015). Descriptive Norms and Expectancies as Mediators of a Brief Motivational Intervention for Mandated College Students Receiving Stepped Care for Alcohol Use. <i>Psychology of Addictive Behaviors</i> , 29 (4), 1003–1011. https://doi.org/10.1037/adb0000092	0	1	1	0

Annex 6. Complete list of coded studies - C. Other mechanisms

Using social norms to change behavior and increase sustainability in the real world: a systematic review

S1. Full coded set

[illegible]

15	Cleveland, M. J., Hultgren, B., Varvil-Weld, L., Mallett, K. A., Turrisi, R., & Abar, C. C. (2013). Moderation of a parent-based intervention on transitions in drinking: Examining the role of normative perceptions and attitudes among high- and low-risk first-year college students. <i>Alcoholism: Clinical and Experimental Research</i> , 37 (9), 1587–1594. https://doi.org/10.1111/acer.12126	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Collins, S. E., Carey, K. B., & Sliwinski, M. J. (2002). Mailed personalized normative feedback as a brief intervention for at-risk college drinkers. <i>Journal of Studies on Alcohol</i> , 63 (5), 559–567. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0036746433&partnerID=40&md5=4a617da60cac5b68e34feac68dfe404b	0	0	0	0	0	0	0	0	0	0	1	1	1
17	Collins, S. E., Kirouac, M., Lewis, M. A., Witkiewitz, K., & Carey, K. B. (2014). Randomized controlled trial of web-based decisional balance feedback and personalized normative feedback for college drinkers. <i>Journal of Studies on Alcohol and Drugs</i> , 75 (6), 982–992.	1	0	0	0	1	1	1	0	0	0	0	0	1
18	Cross, J. E., & Peisner, W. (2009). RECOGNIZE: A social norms campaign to reduce rumor spreading in a junior high school. <i>Professional School Counseling</i> , 12 (5), 365–377. https://doi.org/10.5330/PSC.n.2010-12.365	1	0	0	0	1	1	1	0	0	0	0	0	1
19	Cunningham, J. A., & Wong, H. T. A. (2013). Assessing the immediate impact of normative drinking information using an immediate post-test randomized controlled design: Implications for normative feedback interventions? <i>Addictive Behaviors</i> , 38 (6), 2252–2256. https://doi.org/10.1016/j.addbeh.2013.02.005	1	0	0	0	1	1	1	0	0	0	0	0	1
20	Davis, J. P., Houck, J. M., Rowell, L. N., Benson, J. G., & Smith, D. C. (2016). Brief Motivational Interviewing and Normative Feedback for Adolescents: Change Language and Alcohol Use Outcomes. <i>Journal of Substance Abuse Treatment</i> , 65 , 66–73. https://doi.org/10.1016/j.jsat.2015.10.004	0	0	0	0	0	0	0	0	0	1	1	0	1
21	Dejong, W., Schneider, S. K., Towvim, L. G., Murphy, M. J., Doerr, E. E., Simonsen, N. R., ... Scribner, R. A. (2009). A multisite randomized trial of social norms marketing campaigns to reduce college student drinking: A replication failure. <i>Substance Abuse</i> , 30 (2), 127–140. https://doi.org/10.1080/08897070902802059	1	0	0	0	1	1	1	0	0	0	0	0	0
22	Doumas, D M, & Hannah, E. (2008). Preventing high-risk drinking in youth in the workplace: A web-based normative feedback program. <i>Journal of Substance Abuse Treatment</i> , 34 (3), 263–271. https://doi.org/10.1016/j.jsat.2007.04.006	0	0	0	0	1	1	0	0	0	0	0	1	0
23	Doumas, D M, Haustveit, T., & Coll, K. M. (2010). Reducing heavy drinking among first year intercollegiate athletes: A randomized controlled trial of web-based normative feedback. <i>Journal of Applied Sport Psychology</i> , 22 (3), 247–261. https://doi.org/10.1080/10413201003666454	0	0	0	0	0	0	0	0	0	0	0	0	1
24	Doumas, Diana M, Ph, D., Workman, C., Smith, D., & Navarro, A. (2011). Reducing high-risk drinking in mandated college students: Evaluation of two personalized normative feedback interventions. <i>Journal of Substance Abuse Treatment</i> , 40 , 376–385. https://doi.org/10.1016/j.jsat.2010.12.006	0	0	0	0	1	1	0	0	0	0	0	1	0
25	Flüchter, K., Wortmann, F., & Fleisch, E. (2014). Digital commuting: The effect of social normative feedback on e-bike commuting - Evidence from a field study. In <i>ECIS 2014 Proceedings - 22nd European Conference on Information Systems</i> . ETH Zurich, Zurich, Switzerland. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84905833837&partnerID=40&md5=613751293f919cef661826ea3f2e3eb3	1	0	0	0	1	1	1	1	0	0	0	1	1
26	Gidycz, C. A., Orchowski, L. M., & Berkowitz, A. D. (2011). Preventing sexual aggression among college men: An evaluation of a social norms and bystander intervention program. <i>Violence Against Women</i> , 17 (6), 720–742. https://doi.org/10.1177/1077801211409727	0	0	0	0	0	0	0	0	0	0	0	1	0
27	Hallsworth, M., Chadborn, T., Sallis, A., Sanders, M., Berry, D., Greaves, F., ... Davies, S. C. (2016). Provision of social norm feedback to high prescribers of antibiotics in general practice: a pragmatic national randomised controlled trial. <i>The Lancet</i> , 387 , 1743–1752. https://doi.org/10.1016/S0140-6736(16)00215-4	0	0	0	0	0	0	0	0	0	0	0	1	0
28	Hartwell, C. J., & Champion, M. A. (2016). Getting on the same page: The effect of normative feedback interventions on structured interview ratings. <i>Journal of Applied Psychology</i> , 101 (6), 757–778. https://doi.org/10.1037/apl0000099	0	0	0	0	0	0	0	0	0	0	0	0	1
29	Hopper, J. R., Nielsen, J. M., & McCarl Nielsen, J. (1991). Recycling as altruistic behavior: Normative and Behavioral Strategies to Expand Participation in a Community Recycling Program. <i>Environment and Behavior</i> , 23 (2), 195–220. https://doi.org/10.1177/0013916591232004	0	0	0	0	1	1	0	0	0	0	1	0	0
30	Howe, L. C., Carr, P. B., & Walton, G. M. (2017). <i>Normative Appeals Are More Effective When They Invite People to Work Together Toward a Common Cause</i> (Unpublished study information obtained through survey on the 30th October 2017).	1	0	0	0	1	1	1	1	0	0	0	0	0

31	Kearney, B., Manley, D., & Mendoza, R. (2013). The impact of an alcohol education program using social norming. <i>Kentucky Nurse</i> , 61 (2), 6–7. Retrieved from http://ezproxy.stir.ac.uk/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edo&AN=86919635&site=eds-live	0	0	0	0	0	0	0	0	0	0	0	0	1
32	Koenen, M. A., Chorus, A., Hopman-Rock, M., & Chinapaw, M. J. M. (2017). A novel method to promote physical activity among older adults in residential care: An exploratory field study on implicit social norms. <i>BMC Geriatrics</i> , 17 (1). https://doi.org/10.1186/s12877-016-0394-z	0	0	0	0	1	0	0	0	0	0	0	1	0
33	Kormos, C., Gifford, R., & Brown, E. (2015). The Influence of Descriptive Social Norm Information on Sustainable Transportation Behavior: A Field Experiment. <i>Environment and Behavior</i> , 47 (5), 479–501. https://doi.org/10.1177/0013916513520416	0	0	0	0	0	0	0	0	0	0	0	0	1
34	Kulik, J. A., Butler, H. A., Gerrard, M., Gibbons, F. X., & Mahler, H. I. M. (2008). Social norms information enhances the efficacy of an appearance-based sun protection intervention. <i>Social Science and Medicine</i> , 67 (2), 321–329. https://doi.org/10.1016/j.socscimed.2008.03.037	0	0	0	0	0	0	0	0	0	0	0	1	0
35	Labrie, J. W., Hummer, J. F., Huchting, K. K., & Neighbors, C. (2009). A brief live interactive normative group intervention using wireless keypads to reduce drinking and alcohol consequences in college student athletes. <i>Drug and Alcohol Review</i> , 28 (1), 40–47. https://doi.org/10.1111/j.1465-3362.2008.00012.x	0	0	0	0	1	1	0	0	0	0	0	1	0
36	Lahlou, S., Boesen-Mariani, S., Franks, B., & Guelinckx, I. (2015). Increasing water intake of children and parents in the family setting: a randomized, controlled intervention using installation theory. <i>Annals of Nutrition and Metabolism</i> , 66 (3), 26–30. https://doi.org/10.1159/000381243	0	0	0	1	0	0	0	0	0	0	0	1	1
37	Lapinski, M. K., Maloney, E. K., Braz, M., & Shulman, H. C. (2013). Testing the Effects of Social Norms and Behavioral Privacy on Hand Washing: A Field Experiment. <i>Human Communication Research</i> , 39 (1), 21–46. https://doi.org/10.1111/j.1468-2958.2012.01441.x	1	0	0	0	1	1	1	1	0	0	0	1	1
38	Latkin, C., Donnell, D., Liu, T.-Y. T.-Y., Davey-Rothwell, M., Celentano, D., & Metzger, D. (2013). The dynamic relationship between social norms and behaviors: the results of an HIV prevention network intervention for injection drug users. <i>Addiction</i> , 108 (5), 934–943. https://doi.org/10.1111/add.12095	0	0	0	0	0	0	0	0	0	0	0	0	1
39	Lewis, Melissa A., & Neighbors, C. (2015). An Examination of College Student Activities and Attentiveness During a Web-Delivered Personalized Normative Feedback Intervention. <i>Psychol Addict Behav</i> , 29 (1), 162–167. https://doi.org/10.1038/nbt.3121 .ChIP-nexus	0	0	0	0	0	0	0	0	0	0	1	0	0
40	Lewis, M A, Neighbors, C., Lee, C. M., & Oster-Aaland, L. (2008). 21st Birthday Celebratory Drinking: Evaluation of a Personalized Normative Feedback Card Intervention. <i>Psychology of Addictive Behaviors</i> , 22 (2), 176–185. https://doi.org/10.1037/0893-164X.22.2.176	0	0	0	0	0	0	0	0	0	0	1	1	1
41	Lewis, M A, Patrick, M. E., Litt, D. M., Atkins, D. C., Kim, T., Blayney, J. A., ... Larimer, M. E. (2014). Randomized controlled trial of a web-delivered personalized normative feedback intervention to reduce alcohol-related risky sexual behavior among college students. <i>Journal of Consulting and Clinical Psychology</i> , 82 (3), 429–440. https://doi.org/10.1037/a0035550	0	0	0	0	1	0	0	0	0	0	0	0	1
42	Lojewski, R., Rotunda, R. J., & Arruda, J. E. (2010). Personalized normative feedback to reduce drinking among college students: A social norms intervention examining gender-based versus standard feedback <i>Journal of Alcohol and Drug Education</i> , 54 (3), 19–40. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-78951472225&partnerID=40&md5=4dc47fad7b9de629f7d6f15af95d40d3	0	0	0	0	0	0	0	0	0	0	0	0	1
43	Mattern, J. L., & Neighbors, C. (2004). Social norms campaigns: Examining the relationship between changes in perceived norms and changes in drinking levels <i>Journal of Studies on Alcohol</i> , 65 (4), 489–493. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-4143101307&partnerID=40&md5=bfd5e196b2f6fc0fa28f7601305693ab	0	0	0	0	0	0	0	0	0	0	0	0	1
44	Mccoy, S. I., Fahey, C., Rao, A., Kapologwe, N., Njau, P. F., & Bautista-Arredondo, S. (2017). Pilot study of a multi-pronged intervention using social norms and priming to improve adherence to antiretroviral therapy and retention in care among adults living with HIV in Tanzania. <i>PLoS ONE</i> , 12 (5), 1–15.	0	0	0	0	0	0	0	0	0	0	0	0	1
45A	Mockus, A. (2002). Co-existence as harmonization of law, morality and culture. <i>Prospects</i> , 32 (1), 19–37.	0	0	1	0	1	1	0	0	0	0	0	1	1
45B		0	0	1	0	1	0	0	0	0	0	1	0	1

46	Mogro-Wilson, C., Allen, E., & Cavallucci, C. (2017). A Brief High School Prevention Program to Decrease Alcohol Usage and Change Social Norms. <i>Social Work Research</i> , 41 (1), 53–62. https://doi.org/10.1093/swr/svw023	1	0	0	0	1	1	1	1	0	0	0	1	1	0
47	Mollen, S., Rimal, R. N., Ruiters, R. A. C., & Kok, G. (2013). Healthy and unhealthy social norms and food selection. Findings from a field-experiment. <i>Appetite</i> , 65 , 83–89. https://doi.org/10.1016/j.appet.2013.01.020	0	0	0	0	0	0	0	0	0	0	0	1	0	0
48	Mollen, S., Rimal, R. N., Ruiters, R. A. C., Jang, S. A., & Kok, G. (2013). Intervening or interfering? The influence of injunctive and descriptive norms on intervention behaviours in alcohol consumption contexts. <i>Psychology and Health</i> , 28 (5), 561–578. https://doi.org/10.1080/08870446.2012.752827	0	0	0	0	0	0	0	0	0	0	0	1	0	0
49	Moore, G. F., Williams, A., Moore, L., & Murphy, S. (2013). An exploratory cluster randomised trial of a university halls of residence based social norms marketing campaign to reduce alcohol consumption among 1st year students. <i>Substance Abuse: Treatment, Prevention, and Policy</i> , 8 (1). https://doi.org/10.1186/1747-597X-8-15	0	0	0	0	0	0	0	0	0	0	0	0	0	1
50	Moreira, M. T., Oskrochi, R., & Foxcroft, D. R. (2012). Personalised Normative Feedback for Preventing Alcohol Misuse in University Students: Solomon Three-Group Randomised Controlled Trial. <i>PLoS ONE</i> , 7 (9), e44120. https://doi.org/10.1371/journal.pone.0044120	0	0	0	0	1	1	0	0	0	1	0	0	1	0
51	Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. <i>Journal of Consulting and Clinical Psychology</i> , 72 (3), 434–447. https://doi.org/10.1037/0022-006X.72.3.434	0	0	0	0	0	0	0	0	0	0	0	1	1	1
52	Neighbors, C., Lewis, M. A., Atkins, D. C., Jensen, M. M., Walter, T., Fossos, N., ... Larimer, M. E. (2010). Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial. <i>Journal of Consulting and Clinical Psychology</i> , 78 (6), 898–911. https://doi.org/10.1037/a0020766	0	0	0	0	0	0	0	0	0	0	0	1	0	0
53	Neighbors, C., Jensen, M., Tidwell, J., Walter, T., Fossos, N., & Lewis, M. A. (2011). Social-norms interventions for light and nondrinking students. <i>Group Processes and Intergroup Relations</i> , 14 (5), 651–669. https://doi.org/10.1177/1368430210398014	0	0	0	0	0	0	0	0	0	0	0	1	1	1
54	Neighbors, C., Rodriguez, L. M., Rinker, D. V., Gonzales, R. G., Agana, M., Tackett, J. L., & Foster, D. W. (2015). Efficacy of personalized normative feedback as a brief intervention for college student gambling: A randomized controlled trial. <i>Journal of Consulting and Clinical Psychology</i> , 83 (3), 500–511. https://doi.org/10.1037/a0039125	1	0	0	0	0	0	1	0	0	0	0	0	0	1
55	Neighbors, C., Lewis, M. A., Bergstrom, R. L., & Larimer, M. E. (2006). Being controlled by normative influences: Self-determination as a moderator of a normative feedback alcohol intervention. <i>Health Psychology</i> , 25 (5), 571–579. https://doi.org/10.1037/0278-6133.25.5.571	0	0	0	0	1	1	0	0	0	0	0	0	1	0
56	Paluck, E. L., & Shepherd, H. (2012). The salience of social referents: A field experiment on collective norms and harassment behavior in a school social network. <i>Journal of Personality and Social Psychology</i> , 103 (6), 899–915. https://doi.org/10.1037/a0030015	0	0	0	0	0	0	0	0	0	0	0	0	0	1
57A	Payne, C. R., Niculescu, M., Just, D. R., & Kelly, M. P. (2015). Shopper marketing nutrition interventions: Social norms on grocery carts increase produce spending without increasing shopper budgets. <i>Preventive Medicine Reports</i> , 2 , 287–291. https://doi.org/10.1016/j.pmedr.2015.04.007	0	0	0	0	1	1	0	0	0	0	0	0	1	0
57B		0	0	0	0	1	1	0	0	0	0	0	0	1	0
58	Pedersen, E. R., Parast, L., Marshall, G. N., Schell, T. L., & Neighbors, C. (2017). A randomized controlled trial of a web-based, personalized normative feedback alcohol intervention for young-adult veterans. <i>Journal of Consulting and Clinical Psychology</i> , 85 (5), 459–470. https://doi.org/10.1037/ccp0000187	0	0	0	0	0	0	0	0	0	0	0	1	1	1
59	Pellerano, J. A., Price, M. K., Puller, S. L., & Sánchez, G. E. (2016). Do Extrinsic Incentives Undermine Social Norms? Evidence from a Field Experiment in Energy Conservation. <i>Environmental and Resource Economics</i> , 67 (3), 1–16. https://doi.org/10.1007/s10640-016-0094-3	0	0	0	0	0	0	0	0	0	0	0	1	0	0
60	Perkins, H W, & Craig, D. W. (2006). A successful social norms campaign to reduce alcohol misuse among college student-athletes. <i>Journal of Studies on Alcohol</i> , 67 (6), 880–889. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-33750133994&partnerID=40&md5=5a5509ea95bf5c5920af7e418782c439	0	0	0	0	0	0	0	0	0	0	0	1	1	0
61	Perkins, H W, Craig, D. W., & Perkins, J. M. (2011). Using social norms to reduce bullying: A research intervention among adolescents in five middle schools. <i>Group Processes and Intergroup Relations</i> , 14 (5), 703–722. https://doi.org/10.1177/1368430210398004	0	0	0	0	0	1	0	0	0	0	0	0	0	1

[illegible]

78	Su, J., Hancock, L., Wattenmaker McGann, A., Alshagra, M., Ericson, R., Niazi, Z., ... Adkins, A. (2017). Evaluating the Effect of a Campus-wide Social Norms Marketing Intervention on Alcohol Use Perceptions, Consumption, and Blackouts. <i>Journal of American College Health</i> , Online Adv . https://doi.org/10.1080/07448481.2017.1382500	0	0	0	0	1	0	0	0	0	0	0	0	1	0
79	Taylor, M. J., Vlaev, I., Maltby, J., Brown, G. D. A., & Wood, A. M. (2015). Improving social norms interventions: Rank-framing increases excessive alcohol drinkers' information-seeking. <i>Health Psychology</i> , 34 (12), 1200–1203. https://doi.org/10.1037/hea0000237	0	0	0	0	1	1	0	0	0	0	0	0	1	0
80	Thombs, D. L., Olds, R. S., Osborn, C. J., Casseday, S., Glavin, K., & Berkowitz, A. D. (2007). Outcomes of a technology-based social norms intervention to deter alcohol use in freshman residence halls. <i>Journal of American College Health</i> , 55 (6), 325–332. https://doi.org/10.3200/JACH.55.6.325-332	0	0	0	0	0	0	0	0	0	0	0	1	0	0
81	Thombs, D. L., Dotterer, S., Olds, R. S., Sharp, K. E., & Raub, C. G. (2004). A close look at why one social norms campaign did not reduce student drinking. <i>Journal of American College Health</i> , 53 (2), 61–68. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-4944234965&partnerID=40&md5=5d8cc7a1057da19d1e180558368a3ed2	1	0	0	0	0	0	1	0	0	0	0	0	0	0
82	Thorndike, A. N., Riis, J., & Levy, D. E. (2016). Social norms and financial incentives to promote employees' healthy food choices: A randomized controlled trial. <i>Preventive Medicine</i> , 86 , 12–18. https://doi.org/10.1016/j.ypmed.2016.01.017	0	0	0	0	1	1	0	0	0	0	0	0	1	0
83	Toghianifar, N., Sarrafzadegan, N., & Gharipour, M. (2014). Women's attitude toward smoking: effect of a community-based intervention on smoking-related social norms. <i>Int J Evid Based Healthc</i> . https://doi.org/10.1097/XEB.0000000000000012	0	1	0	0	1	1	0	0	0	0	0	0	0	1
84	Turner, J., Perkins, H. W., & Bauerle, J. (2008). Declining negative consequences related to alcohol misuse among students exposed to a social norms marketing intervention on a college campus. <i>Journal of American College Health</i> , 57 (1), 85–93. https://doi.org/10.3200/JACH.57.1.85-94	0	0	0	0	1	1	0	0	0	0	0	1	0	0
85	Wally, C. M., & Cameron, L. D. (2017). A Randomized-Controlled Trial of Social Norm Interventions to Increase Physical Activity. <i>Annals of Behavioral Medicine</i> . Psychological Sciences, University of California, Merced, 5200 N. Lake Road, Merced, CA, United States. https://doi.org/10.1007/s12160-017-9887-z	0	0	0	0	1	1	0	0	0	1	0	0	1	0
86	Wegs, C., Creanga, A. A., Galavotti, C., & Wamalwa, E. (2016). Community Dialogue to Shift Social Norms and Enable Family Planning: An Evaluation of the Family Planning Results Initiative in Kenya. <i>PloS One</i> , 11 (4), e0153907. https://doi.org/10.1371/journal.pone.0153907	0	0	0	0	0	0	0	0	0	0	0	1	1	0
87	Wenzel, M. (2005). Misperceptions of social norms about tax compliance: From theory to intervention. <i>Journal of Economic Psychology</i> , 26 (6), 862–883. https://doi.org/10.1016/j.joep.2005.02.002	1	0	0	0	1	1	1	0	0	0	0	1	1	1
88	Werch, C. E., Pappas, D. M., Carlson, J. M., DiClemente, C. C., Chally, P. S., & Sinder, J. A. (2000). Results of a social norm intervention to prevent binge drinking among first-year residential college students. <i>Journal of American College Health</i> , 49 (2), 85–92. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-0034267171&partnerID=40&md5=6295e50f7e805e1fba5c3c42bcbeca0	0	0	0	0	1	1	0	0	0	1	0	0	1	0
89	Yurasek, A. M., Borsari, B., Magill, M., Mastroleo, N. R., Hustad, J. T. P., O'Leary Tevyaw, T., ... Monti, P. M. (2015). Descriptive Norms and Expectancies as Mediators of a Brief Motivational Intervention for Mandated College Students Receiving Stepped Care for Alcohol Use. <i>Psychology of Addictive Behaviors</i> , 29 (4), 1003–1011. https://doi.org/10.1037/adb0000092	0	0	0	0	1	1	0	0	0	0	0	1	1	0

Annex 7. Multiple Correspondence Analysis output and coordinate plot (Study 1)

Using social norms to change behavior and increase sustainability in the real world: a systematic review of the literature

Table S2. MCA output

Software: STATA SE 15

Multiple/Joint correspondence analysis Number of obs = 11
 Total inertia = .19416758
 Method: Burt/adjusted inertias Number of axes = 2

Dimension	principal inertia	percent	cumul percent
dim 1	.11939	61.49	61.49
dim 2	.0242333	12.48	73.97
dim 3	.0135218	6.96	80.93
Total	.1941676	100.00	

Statistics for column categories in standard normalization

Categories		overall			dimension_1			dimension_2		
		mass	quality	%inert	coord	sqcorr	contrib	coord	sqcorr	contrib
insitu	0	0.017	0.821	0.117	3.065	0.817	0.155	0.454	0.004	0.003
	1	0.074	0.821	0.026	-0.681	0.817	0.035	-0.101	0.004	0.001
remote	0	0.074	0.821	0.026	-0.681	0.817	0.035	-0.101	0.004	0.001
	1	0.017	0.821	0.117	3.065	0.817	0.155	0.454	0.004	0.003
gsi	0	0.025	0.798	0.054	-1.264	0.448	0.040	2.480	0.350	0.152
	1	0.066	0.798	0.020	0.474	0.448	0.015	-0.930	0.350	0.057
ebo	0	0.058	0.846	0.027	0.685	0.621	0.027	-0.915	0.225	0.048
	1	0.033	0.846	0.047	-1.199	0.621	0.048	1.601	0.225	0.085
environments	0	0.066	0.616	0.015	0.175	0.083	0.002	-0.989	0.534	0.065
	1	0.025	0.616	0.040	-0.468	0.083	0.005	2.638	0.534	0.172
papersobje-s	0	0.033	0.821	0.063	1.531	0.755	0.078	1.003	0.066	0.033
	1	0.058	0.821	0.036	-0.875	0.755	0.044	-0.573	0.066	0.019
digitalpla-s	0	0.066	0.723	0.026	-0.592	0.558	0.023	-0.715	0.165	0.034
	1	0.025	0.723	0.068	1.578	0.558	0.062	1.906	0.165	0.090
discussions	0	0.083	0.702	0.005	0.140	0.206	0.002	-0.481	0.496	0.019
	1	0.008	0.702	0.048	-1.397	0.206	0.016	4.810	0.496	0.191
contextinfo	0	0.017	0.611	0.079	2.150	0.595	0.076	0.791	0.016	0.010
	1	0.074	0.611	0.018	-0.478	0.595	0.017	-0.176	0.016	0.002
tipsandgui-s	0	0.017	0.611	0.079	2.150	0.595	0.076	0.791	0.016	0.010
	1	0.074	0.611	0.018	-0.478	0.595	0.017	-0.176	0.016	0.002
findingsbe-y	0	0.008	0.623	0.065	2.824	0.623	0.066	0.097	0.000	0.000
	1	0.083	0.623	0.007	-0.282	0.623	0.007	-0.010	0.000	0.000
topiccoded	1	0.091	1.309	0.468	3.311	1.309		0.144	0.001	
	4	0.364	1.953	0.282	0.558	0.247		3.256	1.707	
	5	0.545	1.404	0.437	-0.924	0.654		-2.195	0.750	
partcoded	1	0.636	1.178	0.399	-1.026	1.032		-0.855	0.146	
	5	0.364	2.809	0.293	1.795	2.462		1.497	0.348	
yearcoded	1	0.182	0.441	0.426	-1.159	0.353		-1.286	0.088	
	2	0.182	0.406	0.341	1.066	0.373		-0.702	0.033	
	3	0.636	0.084	0.308	0.026	0.001		0.568	0.083	
samplesize-d	0	0.091	1.829	0.468	3.876	1.794		1.211	0.036	
	1	0.455	1.228	0.284	0.006	0.000		2.480	1.228	
	2	0.182	0.552	0.468	-0.682	0.111		-3.016	0.441	
	3	0.273	0.752	0.449	-0.847	0.268		-2.527	0.484	

supplementary variables: topiccoded partcoded yearcoded samplesizecoded



supplementary (passive) variables: topiccoded partcoded_3 yearcoded
coordinates in standard normalization

Annex 8. Citizen questionnaire (Study 2)

[English translation from Spanish original]

“Changing social norms to change the world” research project

Department of Psychological and Behavioural Science

London School of Economics and Political Science



THE LONDON SCHOOL
OF ECONOMICS AND
POLITICAL SCIENCE ■

Questionnaire form (post-test version)

Instructions for volunteers:

1. Please read the instructions included in the **“Survey Application Guide”** below
2. Before starting the survey, fill out sections A - D below (including reading the introduction and signing the informed consent).
3. If the respondent chooses NOT to participate in the survey, please ask them to fill out form E below (this is entirely voluntary, but would help us greatly with the research)
4. Start the survey. Instructions for the interviewers (which are not read to the respondents) are underlined and in italics and the survey questions (which are read to the respondents) are in **bold**.

Contact details for questions:

- Email: p.yamin-slotkus@lse.ac.uk
- Mobile phones:
 - Colombia (Santiago Ortega): +57 320 2302185
 - WhatsApp (Paulius Yamin): +44 7534 921458

Survey Application Guide

Note to volunteers:

Thank you very much for agreeing to help us with this research project. As you know, we are researching the narratives and social norms that exist around some of the citizen culture interventions that were applied in the Antanas Mockus Municipalities in Bogotá. These surveys are very important, because they will allow us to know the opinion of the residents of Bogotá and compare it with that of the people who were directly involved in the design and implementation of the interventions and the written press. Collecting the perceptions of real citizens of the city is very important to understand how we can make interventions of this kind more often and achieve better results in real contexts.

We have prepared a short video explaining the objectives of the research and the survey questions. Please access it using the following link: <https://youtu.be/vmRYGwqcScg>. After watching it and reading the survey questions, please do not hesitate to contact us if you have any questions about the questions, the forms or the research in general.

Thank you very much, we are counting on you!

Paulius Yamin, Santiago Ortega and Andrés Sáenz

Deadline for submission of forms: Thursday 12 October 2017

Contact details for questions:

- Email: p.yamin-slotkus@lse.ac.uk
- Mobile phones:
 - Colombia (Santiago Ortega): 320 2302185
 - WhatsApp (Paulius Yamin): +44 7534 921458

Instructions:

- 1. Watch the following video:** <https://youtu.be/vmRYGwqcScg>
- 2. Before applying the surveys, please read all the questions and make sure you understand them well.** To facilitate application, we have included underlined explanations and instructions for the interviewer on the form. If you have any questions about them or the project in general, please contact us at the email and cell phones listed on the first page.
- 3. Please make sure the people you are surveying are the ones we need. Although they may be your friends, family or acquaintances, we need them:**
 - a. To be current residents of the city of Bogotá** (regardless of how many years they have lived there or if they were born there).
 - b. Be of legal age.**
- 4. Read and follow the instructions included at the beginning of each form.**

5. **Do not forget to take the contact information of each respondent** (explaining that the answers are totally anonymous, and we only collect this data for control purposes). The project will randomly contact people to verify the authenticity of the responses.

A. Interviewer data:

Name of the interviewer: _____

Date: _____

I declare that the data recorded in this survey is real and meets the requirements included in the instructions and checklist.

Signature: _____

B. Checklist before starting:

- ☐ Respondent is a resident of Bogotá (no matter how long ago)
- ☐ Respondent is of legal age
- ☐ I read the welcome information to the interviewee, he agreed to participate and signed the informed consent.
- ☐ I left him a copy of the signed consent form (D2).

C. Welcome information to be read to the participant:

Thank you very much for agreeing to participate in our research! This is a study conducted by Paulius Yamin, Santiago Ortega and Andrés Sáenz on some of the public narratives and social norms of people living in the city of Bogotá.

Your participation in this study is entirely voluntary. If you decide to participate, you can withdraw now or at any time without any negative consequences for me or for you.

We will ask you some questions below. Our goal is to understand your perception of some events that occurred in the city, and therefore there are no right or wrong answers.

Answering the entire survey will only take us 10-15 minutes, and all of your answers are completely anonymous and will only be used for academic purposes. At the end we will ask you for your contact details, but only to check that the people who responded are real.

I will now give you a form to read and fill out, agreeing whether you want to participate or not. Feel free to ask me any questions you may have now or at any time during the survey.

D. Informed consent (to be filled by participants) (INTERVIEWER'S COPY)

"Changing social norms to change the world" research project

Name of the participant: _____

Date: _____

Thank you very much for agreeing to participate in our research! This is a study by Paulius Yamin, Santiago Ortega and Andrés Sáenz on some of the public narratives and social norms of people living in the city of Bogotá.

Your participation in this study is entirely voluntary. If you decide to participate, you can withdraw now or at any time without any negative consequences for me or for you.

We will ask you some questions below. Our goal is to understand your perception of some events that occurred in the city, and therefore there are no right or wrong answers. If you do not feel comfortable answering a question, you may leave it blank.

Answering the entire survey will only take 10-15 minutes, and all of your answers are completely confidential and will only be used for academic purposes. All our data is stored on protected platforms and we will not publish any data that could identify you personally.

If you have any questions or complaints about this study, please do not hesitate to contact the principal investigator, Paulius Yamin, at p.yamin-slotkus@lse.ac.uk. This research has been approved and follows the ethical and information management protocols of the London School of Economics and Political Science.

According to this information, I declare that:

- ☐ I agree to participate in the survey (1)
- ☐ I do NOT agree to participate in the survey (2)

By signing below, I declare that:

- I have read and understood the information provided on this page.
- I voluntarily agree to participate, understanding that I will not receive any compensation in return and that my answers are confidential and no personally identifiable information will be published.
- I live in Bogotá and I am 18 years old or older.

Participant's signature: _____

D2. Informed consent (PARTICIPANT'S COPY)

"Changing social norms to change the world" research project

Name of the participant: _____

Date: _____

Thank you very much for agreeing to participate in our research! This is a study by Paulius Yamin, Santiago Ortega and Andrés Sáenz on some of the public narratives and social norms of people living in the city of Bogotá.

Your participation in this study is entirely voluntary. If you decide to participate, you can withdraw now or at any time without any negative consequences for me or for you.

We will ask you some questions below. Our goal is to understand your perception of some events that occurred in the city, and therefore there are no right or wrong answers. If you do not feel comfortable answering a question, you may leave it blank.

Answering the entire survey will only take 10-15 minutes, and all of your answers are completely confidential and will only be used for academic purposes. All our data is stored on protected platforms and we will not publish any data that could identify you personally.

If you have any questions or complaints about this study, please do not hesitate to contact the principal investigator, Paulius Yamin, at p.yamin-slotkus@lse.ac.uk. This research has been approved and follows the ethical and information management protocols of the London School of Economics and Political Science.

According to this information, I declare that:

- ☐ I agree to participate in the survey (1)
- ☐ I do NOT agree to participate in the survey (2)

By signing below, I declare that:

- I have read and understood the information provided on this page.
- I voluntarily agree to participate, understanding that I will not receive any compensation in return and that my answers are confidential and no personally identifiable information will be published.
- I live in Bogotá and I am 18 years old or older.

Participant's signature: _____

E. Form if you do not want to participate in the survey (to be filled out by the participants)

We understand and respect that you do not want to participate in the survey. However, it would help us greatly in improving future surveys if you could please tell us the reasons why you do not want to (this information is completely anonymous). We will not ask you any more questions based on what you write here, we will not insist on it and we will not contact you.

Please tell us why you decided not to participate:

SECTION 1. OPEN QUESTIONS

*[Please give **Card 1** to the interviewee and let him/her keep it while reading the following information and asking the following questions]*

CARD 1

[Image not included here due to permission rights, please access it here: <https://bit.ly/368NN3S>]

In 1995, a group of mimes hired by the Mayor's Office of Bogotá occupied the corners of some streets in the city.

Thank you again for agreeing to participate in the survey. I will now ask you 3 questions based on the image you see on this card.

Remember that there are no right or wrong choices: what interests us is your personal opinions.

1.1. Do you recognize the situation in the image I just gave you??

- ☐ Yes (1)
- ☐ No (2)

[If you answered YES continue with question 1.2., if you answered NO go to question 2]

1.2. Imagine that a close friend has never heard about the intervention shown in the picture. How would you tell him about this intervention?

[Please write the respondent's answer as accurately and completely as possible. If you need more space, write on the back or on a separate sheet of paper]

1.3. In your opinion, what was the objective of the Mayor's Office of Bogotá to apply the intervention in the image?

[Please write the respondent's answer as accurately and completely as possible. If you need more space, write on the back or on a separate sheet of paper]

1.4. In your opinion, what results did this intervention have on the people of Bogotá?

[Please write the respondent's answer as accurately and completely as possible. If you need more space, write on the back or on a separate sheet of paper]

SECTION 2. CLOSED QUESTIONS

[Please the following message to the interviewee and continue with the questions]

Thank you for your answers. I will now ask you 9 closed questions based also on the image on the card.

Remember that we only want to know your personal opinions.

2.1. Through which of the following means did you first learn that the intervention shown in the image had been performed?

Please tell me all the options that apply.

- ☐ Friends, family or acquaintances told you (1)
- ☐ Strangers told you (2)
- ☐ You saw them directly on the street (3)
- ☐ Through the written press (4)
- ☐ Through the radio (5)
- ☐ Through television (6)
- ☐ Through the internet (7)
- ☐ Other? Which one? (8) _____

2.2. Do you remember discussing the intervention in the image with your friends and family?

- ☐ Yes (1)
- ☐ No (2)

SECTION 3. DEMOGRAPHICAL DATA

[Please the following message to the interviewee and continue with the questions]

Thank you very much for your answers. I just have a few more questions about you.

Remember that all your answers are completely confidential and will be used for academic purposes only.

Your name and contact information are also confidential, will not be shared with anyone, and will only be used to check that real people have answered this survey.

3.1. Age (write a number): _____

3.2. Socio-economic strata of your current place of residence (write a number): _____

3.3. Number of years you have lived in Bogotá (write the number or specify from birth):

3.4. Name: _____

3.5. Mobile phone: _____

[To conclude, please read the following message to the participant]

Thank you very much for participating in our survey. Your answers are very valuable and will help us a lot in our research.

Remember that you can ask me any questions you may have about the research, or you can contact the principal investigator of the project if you prefer in the email that is in the informed consent I gave you.

NOTES:

Annex 9. Sample press, citizen and designer narratives (Study 2)

1. Sample answers from open-ended questions in surveys to citizens

Imagine a close friend has never heard of this intervention. How would you tell the intervention to him/her?

"The image shows Mockus' strategy to force drivers and pedestrians to respect traffic norms and avoid accidents. People were paying attention to mime-artists to avoid ridicule and this was more effective than fines, according to statistics".

"Being Antanas Mockus a pedagogue, he arrived at the Mayor's Office to implement many proposals to achieve a change in the attitudes of people that live in the city. Taking into account that all proposals were innovative and exceptional, they achieved changes: the use of zebra crossings in intersections of the city, using mime-artists, the 'carrot hour' for closing hours in bars, the city's disarmament, and the use of red and yellow cards to improve the city's behaviour".

In your opinion, what was the objective of this intervention?

"To reduce mortality, create awareness and make people understand the importance of following the laws, and for them to understand that the suggestions made by the Mayor's Office have a logical explanation that contributes to the wellbeing y safety of people".

"Mr. Antanas Mockus has always spoken about citizenship culture and with actions such as the mime-artists, the red and yellow cards, the carrot hour, he contributed to make inhabitants follow the city's rules. What's interesting about this achievement is that it was done through ingenuous actions, far from repression or traditional campaigns".

"Since Antanas Mockus had been a teacher for many years, I believe he was applying more educational strategies than the traditional ones to achieve a civic education. It was trying to change the chip of traditional methods and create a different culture in the city".

In your opinion, what results did this intervention had on the people of Bogotá?

"People in Bogotá changed their way of thinking about change and about following rules to be implemented in their everyday lives and, in this way, contribute to the development of society. This will make adults acquire this knowledge and transfer it to their children as a key principle of their behaviour".

"It was positive, you can see people waiting for the traffic lights to change, reducing legal conflicts. Also, the reputation we had of savages little by little is left behind".

"From my personal analysis on citizens, they didn't create any change in the way society sees this type of event, because you can't see a real sense of ownership towards the city's culture".

"Created awareness, but unfortunately it was for a short period of time because, when the campaign was over, so was the civility that it had created".

2. A sample narrative interview to a designer of the original interventions

Participant 1 was the Director of the Culture Observatory at the Mayor's Office of Bogotá in Antanas Mockus' second period as Mayor (2001-2003). He was in charge of the design and coordination of many interventions, especially on the topic of civic resistance. From that time, he has continued working in topics around cultural and behavioural change, and is considered an expert on this topic.

The interview took place on the 29 August 2017 in a Coffee Shop near Bogotá's City Council, where he now works.

PY: *Thank you again for accepting to take part in this interview. As I already mentioned, the idea is that from this picture we just saw, you tell me everything you can remember about these interventions. We are especially interested in your personal involvement and your personal narrative of the events, so details are very useful. I won't interrupt you at any time while you give me your narrative, but I might just ask some clarifications on episodes that weren't clear at the end. Please begin.*

Participant 1:

Ok, we would call our experience "civic resistance" in Bogotá, and it took place from an episode in the city's history when the Revolutionary Armed Forces of Colombia (FARC), who are now in a peace process with the Colombian government, threatened to blow up the Chingaza dam, which is the main source of water for the city of Bogotá. Its destruction would not only cause great damages in Bogotá, but also in other important cities such as Villavicencio. Police even found explosives inside the dam and obviously the citizens and the local administration were alarmed and tried to find ways to counteract the danger posed to Bogotá.

So Mockus took all the measures necessary in terms of security with the Police and Army, but he thought that some citizenship culture interventions could help citizens realize the strategic importance of certain public goods. Goods like, for example, electric power and especially those related to water supply. Antanas organized from the beginning actions that he called "civic resistance", and which in this case wasn't against a government as in the usual definition of civic resistance but against an illegal group.

So, like in all citizenship culture interventions, there were some symbolic actions that were performed by the Mayor himself. That's when he began to wear on an everyday basis, in the office, in the streets, and in public events, a bulletproof vest made of polystyrene foam with a big hole shaped as a heart, and obviously that was meant to defy armed groups saying: "OK, here I am if you want to make attempts against my life, if you dare attacking someone that is only protected by a polystyrene vest that can be broken with a finger".

But after that there were also other citizen culture actions that included the public services companies of the city, I remember several and I had to be involved in organizing of all of them. We also had to confront several challenges, like trying to see this issues from the point of view of

international humanitarian law, because obviously making a terrorist attack against a public service is an action against civilians and should at least be in the Geneva protocols... Nevertheless, the Geneva protocols only included three types of public goods to declare them as protected by international humanitarian law, which were power plants and dams, but the interest of Antanas was to protect the city's water reserves...

It's very curious... Goods like the water reservoir that supplies water for the whole locality of Suba. It's an enormous tank and if there's an attack there it would be a tragedy for a very densely populated part of the city. And yet, that wasn't classified as a protected good under international humanitarian law, so we had to search for other alternatives. We invented a symbol to mark this kind of goods, makings that could be clearly seen even from the sky, and in that way to warn any group that wanted to attack those goods... So the symbol was three triangles together, which I invented myself. And we assigned a symbolic connotation, which had to do with the mountain ranges in Colombia, the three mountain ranges. And with that symbol we marked many of these goods, for example the San Rafael reservoir, which is the alternative reservoir for the city of Bogotá, the reservoir in Suba... These were acts with great publicity, with a lot of communication with the Mayor and the whole cabinet, chiefs of police, etc., who marked and painted themselves these symbols on those goods.

We also looked for another symbol to mark protected cultural goods, which already existed, there is an international protocol that protects cultural goods in the case of an armed conflict. With that symbol that wasn't invented by me, it already existed, it's some circles in red, I remember, with three spheres in the centre, we marked many schools, and many other of cultural importance for the city.

That's what Antanas called civic resistance and we also looked for the commitment of the public services companies of the city, I can remember, for example with an event in Bolívar's plaza [Bogotá's main plaza] by Bogotá's energy company, which installed a real-life high-tension tower there. And they also marked it with the three triangles in a moment when FARC were blowing up energy towers all over the country, and which had also affected Bogotá. So it was an act of defiance to install in Bolívar's square an energy tower, that was... a spectacular action that was recorded by the media and all.

Ok, there were many interventions and I wasn't present in all of them, I was more in the conceptual and strategic part of looking how internationally and with the local norms we could protect the city's goods, even the cultural goods, against attacks by an illegal armed group, how they could be protected, not only from the point of view of force, but how could citizens commit to preserve those goods. Obviously, here we have a controversial topic which is that you can't make citizens to face directly an illegal armed group, but that wasn't the idea. The idea was that citizens became aware of the importance of those goods and let's say, adopted an attitude against attacks towards those goods that provide crucial services for the city, no matter the means or motives. But we never measured the impact of those actions.

We did other things such as... we had a newspaper in the District's Institute for culture and tourism, and in that newspaper we made a public call for the members of FARC to send their opinions, to send articles saying we want this, we think this about his, anything that worked to open the debate between the actors that were involved in the problem. Of course there were many critics, even in the media they said we were opening an opinion forum to FARC, but if that was the case, FARC

didn't even take advantage of that forum... I think in the end we only got one article from a commander of FARC, even if the newspaper was published weekly, and we always insisted on calling the FARC and all leftist irregular groups to contribute...

We never measured that, and I think it's impossible now to know what was the impact of all those citizenship culture actions and if they generated any behavioural change, but it's very possible that they did. If you think of combining these actions with other elements in the citizenship culture strategy that were implemented in Antana's time like respecting life. Bogotá was never the heart of the battle in the armed conflict, I don't think there were big incursions against the city by the FARC, and I believe that FARC always thought that the citizens of Bogotá were hard to convince, don't you think? Citizens weren't going to be convinced by violent actions, and specially actions that were against their interests, but of course, there was also the attack against the Nugal club with 35 mortal victims... But even if there weren't many attacks or violent actions that in the course of the armed conflict affected Bogotá at that time, you can in any case think of those actions oriented to behavioural changes. On the one hand towards FARC, but also towards citizens to take care... not only to take care of public goods but also for cooperation with authorities.

As part of the civic resistance strategy, we also did things with Transmilenio [the main public transportation system of Bogotá]. In Transmilenio, there was a time in which there were also terrorist threats against the system, so we created an action that we applied in many parts of Bogotá. I remember one in the National Park in which we asked citizens to notice any strange things they saw at the system and tell the police, tell authorities what they saw. There never was... well, there were some bombs that exploded in the system but without victims, I believe, because citizens cooperated and we could prevent it from being worst. We are talking about a difficult time in the armed conflict, precisely because one of the things we wanted to accomplish was to involve citizens in the defence, in the protection, of citizens themselves, without putting their lives in danger.

One can easily remember a contrast between the actions that were undertaken and not undertaken by FARC in Bogotá and what drug lords did, don't you think? The Medellín Cartel at the time of the bombs that was just before Antanas Mockus' period as Mayor... At that time there were many bombs, many deaths, and citizens lived basically in an environment of fear. That was precisely because many bombs by the Medellín Cartel were installed in shopping malls, on the streets, in busy streets and that's why there were so many deaths.

PY: *Can you think of something else you would like to tell me about these interventions?*

Participant 1:

Well, yes, maybe the only thing is that all this was always very controversial. There was controversy even from the media, because in a sense it was... these were risky actions but precisely that was the idea, to show terrorism that there were citizens that wouldn't accept terrorist actions, and that we were perfectly aware of the fact that a terrorist action was very difficult to prevent by the police and other security forces in the country... But also that even if as citizens we couldn't defend ourselves against that threat but we are perfectly aware of the fact that what you are doing is bad, and it's not good. That we totally rejected it...

PY: *Good... So I'm going to ask you now for a couple of questions I have about some of the things you mentioned, OK? Do you maybe remember how was it that you invented the three-triangle symbol?*

Participant 1:

(Laughs...) That was a very nice episode because the Mayor asked the graphic designers of many public companies of Bogotá, the IDU, the water company, the electricity company, to propose a symbol. The Mayor was at that time in his office, and we were in our office looking at the projects and we got large sheets of paper with spectacular designs that were very beautiful... but I took a napkin and said: why don't we use three sad triangles? And I drew them on the napkin and... the director of the Institute where I worked called the Mayor and she said: look, there's this idea... The Mayor was already aware of the projects that professional designers had sent, and mine, which was in a napkin, is the one he liked the most.

PY: *And that happened in the call?*

Participant 1:

That happened in the call and it was immediately adopted, and of course designers took the idea and created proper images, and besides being painted in many places we also made posters and stickers to put in public telephones, for example.

PY: *That's nice. And were you involved in the implementation of any actions?*

Participant 1:

Yes, I was always involved in the implementation... For example, in the effort to protect the public services there was one action in Bogotá's telephone company. So there is a building which I think is called "Manuel Murillo Toro" where there's the centre of communications of Bogotá, the offices of telecommunications, so I remember we installed in that building's terrace something very big with the symbol and a message to citizens. I remember one time they called me on a Sunday at 2 PM because one of the things that was holding that thing broke and smashed some of the building's glasses... So I had to go over there that day to see what had happened and fix it. I had to deal with these kinds of things, of small details... Of accidents that happened with these inventions.

Others that were more spectacular didn't have any issues, like the electric tower installed in Bolívar's plaza, which was an important work of engineering because those towers are very big and you can't fix them on the plaza because it's a protected cultural good so it's forbidden to fix even a nail. So they invented a way to holding in place without fixing it to the plaza.

PY: *Good, and do you remember some of the reactions that citizens had to those actions?*

Participant 1:

It was something that attracted attention and changed the city's landscape. It was something shocking for citizens, they always asked questions about it. Citizens were always asking what we were doing, because citizens didn't understand, so you had to explain. Of course there was a lot of broadcasting in the media, but citizens always passed through the places we were doing the citizen culture actions and they were always curious. And then, with a small explanation of what was all about, of what we were doing, and why, citizens seemed to be convinced. Our experience is that you first need the participation and support of citizens. To expose it to citizens in order to generate questions. To generate curiosity on citizens about why and to what end these things are being done.

And of course, mass media is very important. But it's more a commitment by the media than propaganda payed by the administration. When there's an institutional announcement in the press or on TV, I believe that vanishes most of the effect. It has to be something that the media are interested on reporting following their own initiative.

3. Sample newspaper articles describing the mime-artist intervention

One of the first newspaper articles that reports the mime-artist intervention was published on the 9th March 1995, and reads:

"MIME-ARTISTS MADE EVERYTHING VISIBLE

EL TIEMPO Editorial Office - 9 March 1995

In the 11 blocks that are between the 3rd and Caracas Avenue in the 19th Street, nothing went unnoticed yesterday: neither contravening citizens, authorities that preach but don't apply, or the dire state of pavements.

Everybody had something to do with the twenty mime-artists that took the streets. Some took their time and stopped to watch them (including cars), some street vendors protested like María Buitrago protested because everybody was too busy following the mime-artists to look at her merchandise, and yet others seemed to be late and couldn't enjoy this citizen game. What's certain is that their presence made everybody feel more aware of their own behaviour and that the deficiencies of the area's public spaces became evident. For example, each time they found a pothole or a puddle, mime-artists stopped as if faced with an obstacle.

It's like lighting a spotlight on each citizen that is normally concealed by anonymity, explained Manuel Espinel, advisor for the Institute of Culture and Tourism, the institution in charge of the Citizen Culture program.

There was even a moment when the abuse of authorities also became evident, when a white Ford van parked on the pavement on the street of the 19th Street and the 13th Avenue and the mime-artists began to simulate a run over. The Teusaquillo police patrol, license 04-3284 asked them to 'not make a show' out of it because that was a car from the General Prosecutor's Office. Nevertheless, some wondered why the game wasn't for them also" (El Tiempo, 1995a).

More recent articles have shorter, less detailed, but equally interesting references to the interventions, such as the following from the year that Antanas Mockus was a presidential candidate:

“INTERNATIONAL PRESS HIGHLIGHTS ANTANAS MOCKUS’ CAMPAIGN AGAIN

EL TIEMPO Editorial Office - 25 May 2010

‘Time’ magazine and the newspaper ‘La Vanguardia’ from Spain made reference to the green candidate

Describing him as a character that is foreign to politics, that identifies more with academia, the U.S. magazine ‘Time’ argues that, as reflected by the most recent polls, Colombia could be about to become a large classroom.

The important publication highlighted Mockus as the person that transformed a chaotic city in one of the most viable in Latin America. Recalling his pedagogical and citizen-culture policies, ‘Time’ stresses the positive impacts in the city’s living standards of proposals like ‘the carrot law’, or the mime-artists that mocked those that didn’t comply with traffic norms. [...]” (El Tiempo, 2010a).

Twenty years after the first mime-artist intervention was applied, an article analysing the challenges of the new Mayor of Bogotá mentioned the interventions (among others that same year):

“THE CHALLENGES FOR THE NEW MAYOR OF BOGOTÁ THAT CAN’T WAIT

EL TIEMPO Editorial Office - 25 October 2015 (El Tiempo, 2015)

Street theft, street networks, define a garbage disposal model and improve Transmilenio are priorities

[...]

Save civility

A great challenge that Enrique Peñalosa faces is to recover citizenship culture.

The civility that was achieved over years of campaigns over the two terms of Antanas Mockus as Mayor will be another of the challenges, since on the street it is common to find people that don’t comply with norms: they don’t use zebra crossings, they damage public goods and they throw garbage on the street.

In the past, citizens learned, with mime-artists and black stars on the streets, to safeguard their own lives and respect traffic signals and rules. On top of that, the city has become a stage to solve conflicts through violence. [...]” (El Tiempo, 2015).

Annex 10. Basic statistics and characteristic words and phrases for Thematic Classes (Study 2)

Table 1. Basic statistics for press and citizen narratives

	Press narratives	Citizen narratives
Number of articles/participants	80	117
Total word count	47,930	8,330
Unique words analysed	8,082	1,367
Classified E. C. U. s	1147 (85.7%)	201 (85.9%)
Lexical classes	4	6
Distribution of classes (%)	P1. <i>Political and institutional context</i> (size: 12.4%)	C1. <i>Antanas Mockus and civic culture</i> (16.9%)
	P2. <i>Intervention problem and objective</i> (23.4%)	C2. <i>Intervention objectives (emphasis on law and policy)</i> (15.9%)
	P3. <i>Intervention description</i> (34.5%)	C3. <i>Intervention objectives (emphasis on education)</i> (13.9%)
	P4. <i>Personal story of Antanas Mockus</i> (29.7%)	C4. <i>Intervention objectives (emphasis on behaviours)</i> (16.4%)
		C5. <i>Intervention objectives (emphasis on awareness)</i> (18.9%)
		C6. <i>Art and urban change</i> (17.9%)

Table 2. Characteristic words and phrases for thematic classes

Thematic class (size)	Top characteristic words	Top 3 characteristic phrases (ECUs) with characteristic words in bold
PRESS NARRATIVES		
P1. Political and institutional context (size: 12.4%)	municipal council agreement subway company district system approve etb (public energy company) require bromberg (last name of another Mayor) peñalosa (last name of another Mayor) surcharge	<i>establish</i> a sustainable and articulated public transport system that includes the construction of the first line of the heavy subway that will require an agreement with the nation for the financing of the mega-project and obtaining certain resources from the district single transit authority despite the fact that the council did not approve the draft project agreement proposing the creation of the company of the system of time and public space 'estep' through which the institute of urban development 'idu' the national government was always in favour of making the subway but at first the district administration did not agree then the district said yes as long as the construction of the first line was accompanied by a bus system
P2. Intervention problem and objective (23.4%)	culture citizen education improve coexistence urban behaviour plan city programme social entity	its government plan consisted of six points civic culture environment public space accelerate social progress improve urban productivity and recover institutional legitimacy the priority was civic culture in which it promised things like the programme of civic culture is the main strategy of the development plan form city of the mayor antanas mockus and although until now their achievements are shy after one hundred days of government is the program with more concrete works mockus' civic culture emphasized duties but in my government it emphasized rights such as the right to education , to work, to safety and that also generates enormous changes in citizen behavior argued the former mayor
P3. Intervention description (34.5%)	street mime-artists driver road avenue pedestrian lane respect teach white cross zebra-crossings	what happened to the mimes one of the programs with the greatest impact was the mimes that in March 1995 went out to 19th street to teach pedestrians and drivers how to cross the zebras and keep the road intersections clear in addition, a group of mimes and another group of actors dressed in 1930's style and riding bicycles go out on the streets some days of the week to teach people how to cross the zebras and reward or disapprove the behavior of drivers and pedestrians Here are some examples of programs that had a great communication impact but ultimately did not turn out to be what happened to the mimes who went out on 19th Street in March 1995 to teach pedestrians and drivers how to cross the zebras and keep the intersections clear
P4. Personal story of Antanas Mockus (29.7%)	green party country colombia say	the author of the text is michael shifter president of the inter-american dialogue and professor at the university of georgetown mockus has the gift of making people happy apparently that is what colombia was looking for assures talking about the candidate of the green party

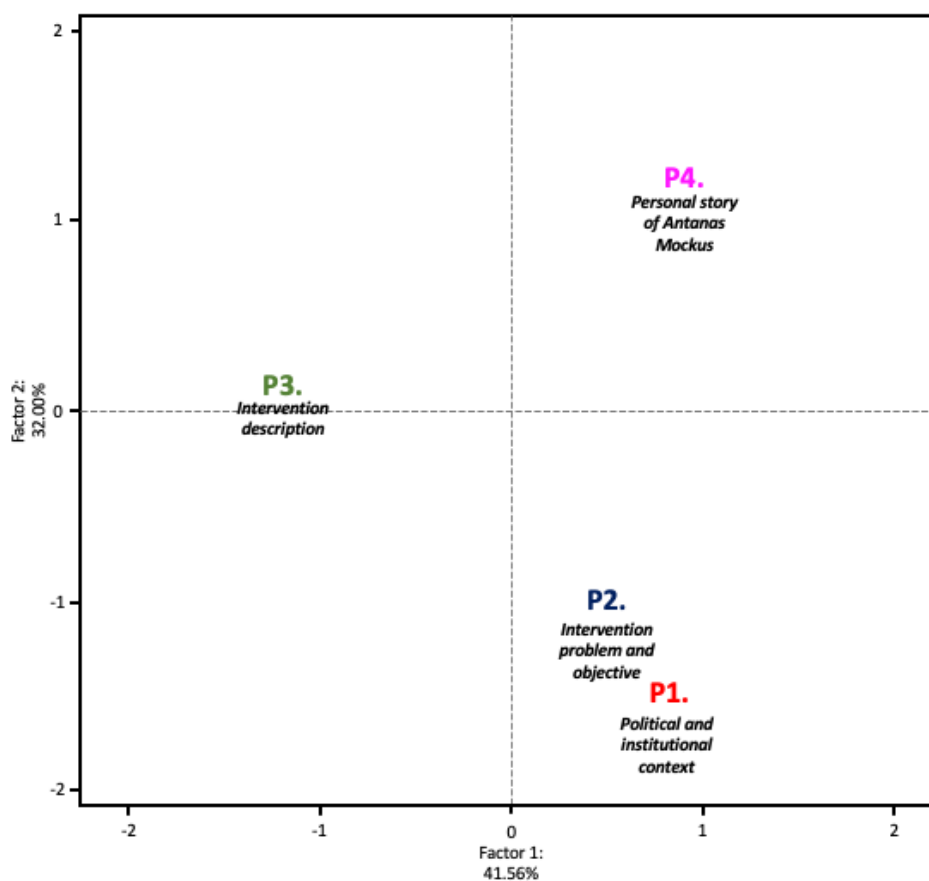
Thematic class (size)	Top characteristic words	Top 3 characteristic phrases (ECUs) with characteristic words in bold
	sommer want professor mockus day language violence	also dedicated a space to talk about the Colombian presidential candidate highlighting the fact that mockus is a philosopher and mathematician who comes from the academic world and not from traditional politics the Argentine publication shows the green party candidate as the favourite to win the elections in explaining what kind of politician green party candidate is shifter says that one should be careful in calling him a rebel mockus is politically understood and intensely passionate says
CITIZEN NARRATIVES		
C1. Antanas Mockus and civic culture (16.9%)	mockus citizen search antanas mayor objective one see part bogota teach promote	the intervention shown in the image is part of a strategy implemented during the antanas mockus mayor's office to promote civic culture is a pedagogical strategy that sought to make citizens learn how they should behave in certain situations to guarantee the well-being of the city and its citizens in the photo you can see a project that the mayor antanas mockus developed with some mimes in strategic places of the city to make pedagogy about civic culture respecting rules dear friend this situation happened when mockus was of mayor and generated a campaign to make conscience and use of the zebras in the streets of bogotá use mimes to make effective its company with the objective to make civic culture
C2. Intervention objectives (emphasis on law and policy) (15.9%)	result reduce people law index make norm danger accidents good continue purpose	the mayor made this intervention to reduce the accident rate in our country did not have very good results because people have very little tolerance and do not like to comply with the rules that are taught in society people are not prepared to accept changes This took place in 1995 and obtained results that made the spectators aware of the need to avoid accidents and to follow the rules as I mentioned before. The mayor's office carried out this intervention to make the citizens aware of the need to lower the accident rates and to promote the good use of the zebra . an intervention carried out by the bogota mayor's office in 1995 to educate the people and create a method to reduce the number of car accidents and deaths due to carelessness positive results were obtained since the population is more wary on the roads and the drivers are more careful
C3. Intervention objectives (emphasis on education) (13.9%)	driver pedestrian as well as educate recklessness avoid reduce say respect passer-by accident accidents	I would count it as an awareness campaign for Bogotanos when they are on the street the objective was to educate both the pedestrian and the driver to avoid accidents and to respect the road had a positive impact in order to achieve the planned objective I would start by telling you the importance of respecting the pedestrian and the different ways to educate drivers to respect the mimes with the goal to educate both the pedestrian to have a specific place to cross a life

Thematic class (size)	Top characteristic words	Top 3 characteristic phrases (ECUs) with characteristic words in bold
		<i>was an optimal result as people began to understand what this measure was about for both drivers and pedestrians and thus a number of pedestrian accidents and deaths were prevented and car mobility improved</i>
C4. Intervention objectives (emphasis on behaviours) (16.4%)	cross pass pedestrian vehicle comment first use space street traffic light make use respect	<p><i>to make people aware that we should use the zebra when crossing a street because it is designed for pedestrian use and thus avoid traffic accidents</i></p> <p><i>the mayor's office launched an educational program with mimes who were on the streets to show people how to pass the street respect for their lives so that people respect traffic signs and do not risk their lives trying to cross the street</i></p> <p><i>This intervention had both positive and negative results, firstly because some people are more civic-minded and there is a sense of citizenship, and secondly because pedestrians who, because of their eagerness to cross a street, do not look at the danger that may arise from not passing through the sites marked for the pedestrian crossing</i></p>
C5. Intervention objectives (emphasis on awareness) (18.9%)	change time take implement behaviour achievement after correct allow impact duty knowledge	<p><i>It did change many people's awareness about taking care of their physical integrity and leaving excuses aside, but that is still a very long process that takes a lot of time to educate people and not everyone takes it in the best way</i></p> <p><i>seeking to create citizen awareness about the correct use of the zebra if I achieve a result to people who have a sense of real belonging achieving an internalization reflection and be an agent of change impacting campaigns allow to create a real awareness</i></p> <p><i>On one occasion, a playful campaign was carried out with mimes to understand in a better way the use of the zebra, to create awareness and a change in the culture that the citizens were handling at that time when they were unaware of this new traffic signal</i></p>
C6. Art and urban change (17.9%)	artist show talent art public show ability city culture colombian message place	<p><i>the reality always the mime artists do it in free spaces and public parks in the city of bogota which the mayor's office recognizes these artists since these people are demonstrating their arts and culture and try to be better every day in our city of bogota</i></p> <p><i>I would tell about an artist in a public space showing his talent and skills and culture to a group of people which is important to some people in Bogota or elsewhere in the country</i></p> <p><i>they are people with a lot of art showing their activities and culture in public places in the city of bogota with the purpose of making the mimes known more and that the bogotanos enjoy their cultural activities</i></p>

Annex 11. Multiple Correspondence Analysis output and coordinate plots (Study 2)

Software: Iramuteq – R package

Press narratives:4



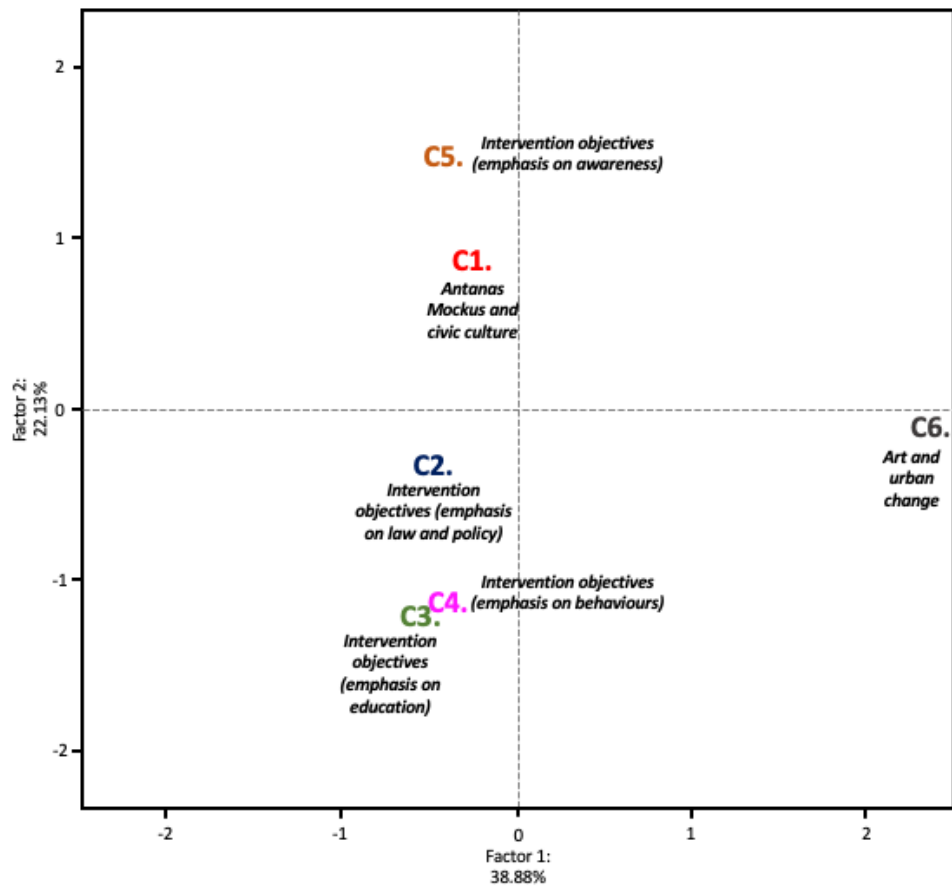
Inertia:

Factor (dimensions)	Own values (principal inertia)	Percent	Cumulative
Factor 1 (x)	0,33806	41,56	41,56
Factor 2 (y)	0,26035	32,00	73,56
Factor 3	0,21508	26,44	100,00
Total	0,81349	100,00	-

Coordinates:

Class	Theme	Coordinates	
		Factor 1 (x)	Factor 2 (y)
classe 1	P1. <i>Political and institutional context</i>	0,82	-1,51
classe 2	P2. <i>Intervention problem and objective</i>	0,43	-0,99
classe 3	P3. <i>Intervention description</i>	-1,34	0,18
classe 4	P4. <i>Personal story of Antanas Mockus</i>	0,93	1,28

Citizen narratives:



Inertia:

Factor (dimensions)	Own values (principal inertia)	Percent	Cumulative
Factor 1 (x)	0,51370	38,88	38,88
Factor 2 (y)	0,29231	22,13	61,01
Factor 3	0,18378	13,91	74,92
Factor 4	0,17804	13,48	88,39
Factor 5	0,15333	11,61	100,00
Total	1,32115	100,00	-

Coordinates:

Class	Theme	Coordinates	
		Factor 1 (x)	Factor 2 (y)
classe 1	C1. Antanas Mockus and civic culture	-0,23	0,98
classe 2	C2. Intervention objectives (emphasis on law and policy)	-0,47	-0,36
classe 3	C3. Intervention objectives (emphasis on education)	-0,58	-1,20
classe 4	C4. Intervention objectives (emphasis on behaviours)	-0,53	-1,14
classe 5	C5. Intervention objectives (emphasis on awareness)	-0,49	1,45
classe 6	C6. Art and urban change	2,19	-0,15

Annex 12. Narrative Policy Framework codebook (Study 2)

Narrative Policy Framework codebook for Study 2 (based on Shanahan et al., 2018, pp. 343–344)

Following NPF guidance, categories were coded only once per unit of analysis, which in this case were unique articles (for press) and unique participants (for citizens).

Category	Definition
I. Demographics	
Code of the narrative	Unique code for each unit of analysis based on type of policy actor (press-citizens)
Date of the narrative	For press articles, publication date
Coder initials	Initials of the coder in charge of each unit
Narrative author	For press, author of the article
II. Narrative elements: characters <i>Coding schema: 0 = absence; 1 = presence</i>	
A. Hero	<p>“Those who take action with purpose to achieve or oppose a policy solution”.</p> <p>The following categories were defined:</p> <ul style="list-style-type: none"> - Antanas Mockus - The Mayor’s Office - The mime-artists - The citizens - Other? Which one:
B. Villain	<p>“Those who create a harm, or inflicts damage or pain upon a victim or, in other cases as one who opposes the aims of the hero”.</p> <p>The following categories were defined:</p> <ul style="list-style-type: none"> - The citizens - The mime-artists - The drivers - Other? Which one:
C. Victim	<p>“Those who are harmed by a particular action or inaction”.</p> <p>The following categories were defined:</p> <ul style="list-style-type: none"> - The citizens - The mime-artists - Other? Which one:
D. Other characters	<ul style="list-style-type: none"> - Beneficiaries: those that benefit from the intervention (specify who) - Allies: those that support the hero, without being heroes (specify who) - Opponents: those that oppose the hero, without being villains (specify who)
II. Narrative elements: moral or policy solution <i>Coding schema: 0 = absence; 1 = presence</i>	
A. Other civic culture interventions or initiatives by Mockus	Mark if these or other policy solutions are mentioned in the narrative

B. Physical changes in the city	
C. Law and norms	
D. Fines and police control	
C. Other? Which one	
III. Narrative elements: plot	
<i>Coding schema below</i>	
0 – No plot	If no plot is present
1 – Story of decline	“if the plot describes how in the beginning things were good, but got worse, and are now so bad that something must be done”.
2 – Stymied progress	“if the plot describes how things were terrible, got better due to a hero, but are getting worse because someone/thing is interfering with the hero’s work”.
3 – Change-is-only an illusion	“if the plot describes how everyone always thought things were getting worse (or better) but they were wrong the whole time, and how things are actually going in the opposite direction (decline or improvement was an illusion)”.
4 – Story of helplessness and control	“if the plot describes a situation as bad, and that it has always been believed the situation must be acceptable because it was unchangeable, but describes how can change can occur”.
5 – Conspiracy	“if the plot describes a story moving from fate to control, but also having a twist ending that a certain small group knew how to control it all along and have been keeping control for their own benefit”.
6 – Blame the victim	“if the plot describes a story moving from fate to control but locates the control in the hands of those suffering from the problem”.
7 – Pessimist (not originally in NPF)	If the plot describes a situation that was bad, that didn’t improve with the intervention, and that is still bad today.
8 – Optimist (not originally in NPF)	If the plot describes a situation that was bad, then it got better with the intervention, and it is still good today.

Annex 13. Subjective Evidence-Based Ethnography ethics note (Study 3)

LSE Research Ethics Review form

Project:

Changing Behaviours to Change the World: Improving social-norm interventions
to change behaviour in the real world.

Annex 2. Subjective Evidence-Based Ethnography –SEBE: Ethical Issues

Subjective Evidence Based Ethnography –SEBE is a method to collect “subjective experience” (Lahlou, Le Bellu, et al., 2015, p. 1). *Overt* behaviour is captured in First Person Perspective –FPP through miniature cameras called “subcams” (subjective cameras), which are worn at eye-level by participants (Lahlou, Le Bellu, et al., 2015). Then, Replay Interviews –RIW where participants watch their FPP videos and comment on them are conducted, revealing also *covert* behaviour, or the “emotions, goals, motivations, interpretation, intentions and more generally psychological processes” (Lahlou et al., 2015, pp. 1–2).

SEBE is “a form of digital ethnography in that, in order to understand participants’ life in their personal and cultural perspective, it gets data in the field and from discussions with ‘native’ participants themselves” (Lahlou, Le Bellu, et al., 2015, p. 2). Nevertheless, SEBE differs from classical ethnography in that the researcher does not need to be present when the FPP videos are recorded, but rather confronts in the RIW “emic (informant’s) and etic (researcher’s) perspectives to find a description that is acceptable in both based on the display of shared evidence (the subcam film)” (Lahlou, Le Bellu, et al., 2015, p. 2).

Because the SEBE method “uncovers very private and sensitive aspects of individual psychology” (Lahlou, 2011a, p. 49), it raises ethical issues that must be carefully considered by researchers. These pertain to privacy, awareness, consent and image rights of both the “subcamer” (participants wearing the subcam) and the “cast” (other people recorded by subcamers) (M Everri, 2014). Managing these issues is especially important when using the SEBE method because its effectivity is based on establishing a relationship of trust between the participant and the researcher (Lahlou, 2006, 2011a). Establishing such a link is the only way participants will disclose their goals with the researcher, which is essential because participants are considered research collaborators, engaging in “cooperative observation” and “intensely contributing to the interpretation of collected data” (Lahlou, Le Bellu, et al., 2015, p. 2).

To ensure this and avoid “any possible harm or embarrassment to participants” (Lahlou, Le Bellu, et al., 2015, p. 4) strict ethical protocols are designed in researches that use the SEBE method, including the following standard measures (adapted from Everri, 2014; see also Lahlou, 2006a; Lahlou, Le Bellu, et al., 2015):

- **Informed consents** are signed by participants and researchers before engaging in any activities. Among other elements, these include detailed descriptions of the research project, its methodological procedures and its purposes, statements regarding voluntary participation and withdrawal at any time, confidentiality procedures and clear contact data for both participants and researchers.
- **Detailed ethical procedures and forms** are shared before the start of the project with the relevant institutions, authorities, and Ethics Committees to ensure their agreement.
- **Participants keep full control of their data**, including the opportunity of reviewing, editing or deleting portions or the whole of the recordings before the researchers have access to it, and explicit consents to share or publish any materials.
- **Anonymization procedures** are offered to participants, including name changing, blurred faces and mute speech (with subtitles).
- **Cast** (other people recorded by subcameras) is also contacted to inform them of video capturing activities and obtain informed consents (preferably before the recording takes place). Where this is not possible, like in public spaces, anonymization procedures are followed with the images of their appearances.
- **Data storage and protection** procedures are implemented to ensure the safety of information and the privacy of the subjects.
- **Final disclosures** with participants are conducted, often including the distribution of the final video materials for personal use, a summary of findings and in occasions some practical advice about the subject studied.
- **Publication consent forms** are also signed by participants and researchers with clear descriptions about sharing and publication permissions.

Annex 14. Sample driver replay-interview data (Study 3)

This Annex presents the complete transcription of the replay interview conducted to participant 5 from Study 3. The complete videos of the subcam recording and the interview can be accessed online (via private links) on:

- Subcam recording: <https://youtu.be/oUuL2lb4Ehs>
- Replay interview: <https://youtu.be/FifgiCG1P8>

This interview was conducted by Paulius Yamin and Santiago Ortega on the 25/08/2017. Participant 5 is a 41-year-old truck driver that has been working on the company that is the focus of our intervention for two years. He has more than 20 years of experience as a truck driver, 16 of which were in Spain, Italy, Germany and the Netherlands.

Interviewers (I): *Thank you again for agreeing to take part in this project. As you know, we are asking very good drivers to use the subcam for some minutes and then to give us an interview in which we look at the video and you can explain to us what you are doing, why, and so on. We are not experts in truck driving so it would be great to understand... So you lived abroad, right?*

Participant 5 (P5): Many years ago I went abroad. I lived almost 16 years abroad. I lived in Spain, Italy, Germany and I ended up in Amsterdam. But if you ask, I'll never change Colombia. People ask me why I came back and I ask say: this is my land, isn't it?

I: *And what did you do there?*

P5: I was also driving. There they respect more traffic norms, there's more cameras, everyone is more... organised. You use your mobile and 3 kilometres down the road they stop you. You ask what happened and they tell you: "the helicopter took a photo of you using your mobile while driving". It's that easy. So there you take more care of yourself, you get accustomed to use the safety belt. I always put it on before turning the truck on. Here it's not like that. But there you have to study to get a license.

I: *How much time do you have to study?*

P5: It depends, if you're good you can get it in 3 months, but they only give you two chances and it costs a lot of money.

I: *And did you learn how to drive there, or here?*

P5: I learnt here. I have been driving for 20 years. I have been in this company for two years. Here they are very strict so people generally don't last that long... Drivers in Colombia are considered lazy. I mean that it's common to hear: "I'll stop here, I'll sleep here, and I'll stay here". But the company says: "not here! You can only do it here and here". That means it's organised, and I like that. It's a matter of getting used to it, isn't it?

I: *Of course, of course. Ok, we'll begin now playing the video and you can tell us what you are doing.*

P5: Do you see that [puts on seat belt on video]? It's my obsession. It's my safety after all.

I: What did you do there?

P5: That's the two safety breaks, the trailer and the front part. I'm using indicators there to get onto the road because you were in front of me, and it was difficult because there was another truck parked. It was badly parked, despite having a big space to park just some metres before. Sometimes there are other truck drivers that reduce their speed to let me through, but that wasn't the case this time. So I had to wait, to be prudent, because this is a vehicle that's 13 metres long.

The trailer I had at that moment is one of the longest we have in the company, so driving depends of each person. Driving depends a lot on how cunning you are and of day to day. I'm always watching my mirrors because they are my eyes in the back. Why do I do that? Because of motorcycles. Because in some seconds motorcycles appears on the right, on the left... and thank God, I haven't had any accidents yet.

I: You're looking a lot on mirrors even if you are going straight, right?

P5: Of course, because that's the most dangerous place. When you're going on a straight line motorcycles go very fast, so I'm going on the left lane at that moment because there are so many motorcycles and bicycles on the right. I am supposed to go on the right-hand side, but I won't do it until there are no more motorcycles or bicycles... I drive a motorcycle myself and I go pretty fast. I have always liked motorcycles a lot... There I looked several times because I was going to overtake that vehicle.

There I'm going into the road that goes to Buenaventura, it's very dangerous here, there has been a lot of accidents because motorcycles are always appearing out of nowhere, and there are buses stopping on the road and collecting passengers, so I can't go in the right lane. I often have to maintain a lot of space and to cut it quickly. Look at what that motorcycle is doing, that's not permitted, but they don't care.

You also have to be very attentive of your front because gears in very large vehicles are multiplied. So you have to be very attentive about what gear you are on, you have to remember very well because sometimes you get it wrong and the car stops. And getting a vehicle like that to move is very difficult, it takes a lot of time. You ultimately get used to it, you touch the gear stick and you know which gear you are on. You also hear the revolutions in the vehicle and you know in which year you are on... Ultimately, you learn to get it right because of the sound. I've been with this vehicle two years, so you get to know it. This is my second home, so I keep it pretty.

I: And why do you have a hat there?

P5: It's a hat from the region in which my wife was born. I also worked in that area in the oil refinery, but I no longer do it, I got tired. Now I only work in this company and the most faraway places I go to are Cartago and Buenaventura. I only do these short routes.

Oh, there you see I'm being very attentive because there's a tractor. It doesn't have number plates or anything, so I'm looking for a discontinuous line to be able to overtake him. And look, that's what I'm saying: look at the space you have here. There's motorcycles, there's people, and they get in your way. And there are lots of people exercising. I always look a lot at that part of the road, because I could be one of them. I do a lot of sports. You have to give them more space, you have to be more careful. There are other drivers that don't do that.

I: Are you moving something else there?

P5: No, nothing, only the indicators. But you have to be very aware of the revolutions and the pressure of the brakes. The truck is always saying everything, she screams if there's any failures, there's sounds and there's a red light also.

I: *Ah, you finally could overtake the tractor there...*

P5: Yes, being very careful. That's the most important thing. And music that must never be absent. I listen a lot of Mexican music that I carry in a USB stick. Yesterday, for example, I worked all night, so I have to listen to something with rhythm so that I don't get sleepy. I have every kind of music. We have too many hours to stick to one kind of music only. There I hadn't sleep well because I worked all night in Cartago parking trucks, so you have to put something that has rhythm so that you don't get sleepy.

I: *So you work parking trucks and then you do this kind of routes?*

P5: Yes, I'm coming here because I live near where we are. I have an apartment here, so I want to sleep well all day long, and then at 4 or 5 PM I will come back and see what I can help with. My wife is still in the oil camp where I used to work. She works there. I work more but she earns more. She works there for 20 days like me, she's an administrator in the oil camp, and she is in charge of food supplies, it's not a difficult job.

Here I always have to check my speed. Because you know that truck drivers, as professional drivers, are always aware of policemen. And policemen are aware of them. They already know when you are passing through, so they don't give you a fine because they already know that you have a bill in your hand. If you did something wrong, you give him your documents with a bill inside and that's it.

I: *Of course... And how much does is the tariff right now?*

P5: Overtaking in a continuous line generally costs around 20,000 to 30,000 pesos [around £7], so I try not to do it... That's what you learn abroad. In Germany, you can't overtake before 6 PM, if you are behind a slower vehicle you can't do it until it's 6 PM. That's for trucks of course. You also have to let all the cars pass and there are cars that go 300 km/h, or 200, so you have to give them space.

Here I'm arriving at the roundabout, so I have to go left I have to give it a lot of space to be able to do it. I'm using my indicators for everyone to see me, it's a large vehicle. People are reckless... They are always late and since they know a truck goes slowly they always try to overtake us, so instead of braking they just go faster. So I have to be aware of that...

I'm carrying here 13 meters, and every day we see colleagues that get killed. This road is one of the most dangerous in Colombia, where more people get killed. This road is not for everyone and now that they are doing another lane people are going faster and faster. An advantage of this company is that they don't make us go too fast. They are not asking you where are you all the time and why aren't you here yet... So you can keep your rhythm. You can say: "boss I'm tired". And they'll let you sleep.

I: *So in other companies they put pressure on you to be really fast?*

P5: Of course, whether you are sleepy or not... If there's something good in this company it's that, they care if you are sleepy or not, they tell you to see your family... Very few companies do that, and I know many companies. My cousins have been truck drivers all their lives, and in other

companies you have to be there on time, there is not alternative. But of course in this company they are very strict on other things, if you make a mistake they throw you away. You can't say: "let's talk about it".

I: *What mistakes for example?*

P5: I mean, if you are reckless, if you don't obey orders... Of course if you get a ticket and the company notices they call you and they ask you what happened, and you have to explain. And you have to pay it yourself or they will take it from your salary...

As you see here motorcycles shouldn't be on the hard shoulder, they should be on a lane. But most of my co-workers don't see it that way: they just think there are obstructing them.

I: *Sure, so... we are asking everyone what do they think we could do to make other drivers aware of all those things.*

P5: The first thing is that they should do proper courses here in Colombia. Here nobody does any course, they just buy their licences, so when they start driving it's because a friend taught them or because you need to get money for your family. Do you understand? So the first thing is to make courses. I have done courses here, I have done courses abroad, and that's been very good for me because I've been driving for 20 years and I've never had an accident. My father taught me how to drive and he never had an accident either. He taught me something: sleep well and be patient. You can't go fast in these vehicles. What happens with these vehicles is that you are carrying 34 or 35 tonnes on our back, and if you go fast you can't be breaking all the time, because brakes get hot and when you try to use them they don't work anymore. And where are you going to end-up with 34 tonnes in your back?

That's the first thing, and then to get experience, but good experience. Nowadays there are many drivers that are very young... When I first got my licence we couldn't get one when we were 20 years old. I started with a small vehicle, and then a larger one and so on. But now you can do it very young and start right from the big truck. Here in the company, for example, you have drivers that are 22 years old. But I always say that nobody is born knowing these things. Look at you, for example: you are trying to learn, you come from a university, you are making an effort, and you lose your hair because of so much thinking (laughs)...

But it's hard to see people doing the same as you from one day to the next... So where is the importance of experience? At least in what you are studying you can't kill people, but we can... We are a machine, and I call it a mortal machine because if I knock down something I'll kill it. I think that the authorities should be more rigorous... But well, they are doing it because before a licence costed 800.000 pesos, and now it costs more than double. It was a great increase, and there's new laws that say that you can only get a licence after you are 25 years old...

Is there anything else you want to know?

I: *Yes, in the topic of fuel consumption, what would be your recommendations to reduce it?*

P5: Well the first thing is to really check your vehicle when you are going to start driving, so that it's not leaking anything. And the company has to show you the average consumption of that machine. Because then they accuse you of spending more fuel, and you check the average consumption and it turns out you are doing it right. I have for example the obsession of taking pictures of the tank, although here the advantage is that tanks are sealed. Everything is sealed.

Also, for consumption it's very important to lift your foot from the gas pedal. There are many drivers here that go very fast. You have to be attentive to see that the fuel is burning right and the vehicle has not any failures, that it doesn't have any leakages anywhere, because then the driver is the thief. Also, when you put gas in your truck you have to measure what you're putting in, and to write it with the kilometres you are making, the hours and so on. Here in the company they give us a paper, and we have to write these things always. Fuel consumption is around 6.2, so if you are in 5.8, 5.9 or 6 you are doing it good. The GPS area calls you each month to tell you how was your average consumption. They say: "you are good, you are in 6 .1 or 6". And if you are doing worse they send you Mr. Ancizar, who's the instructor here, and they do tests to the vehicle.

Something that also happens is that when entering the gear you accelerate a little bit to make it easier... And a lot of us don't use the clutch. We use it very little. Is that good or bad...? Well, it's good for the truck but bad for us, and for consumption, because you always accelerate a little bit to enter the gear. But there are many drivers that accelerate too much, or that are used to accelerating two times repeatedly. But that's more to show off... So that everyone sees you... All that is consumption, isn't it? Also, when you are going down with cargo, you can go on a short gear and with the engine break, and that way you use less fuel as well.

I: How many revolutions you maintain when going down?

P5: We go down at around 1,800, and the maximum is 2,000. When you are going in the same level you have to keep it to around 1,200. And when you're going up, you have to change gears at 1,600, or 1,500, depending on the truck and on how is the gradient. If you do that, if you maintain certain revolutions, you'll be able to enter the gears... If you don't, when you try to change gears you'll feel that you are being pulled to the back. The truck stops and the best thing you can do is to brake and begin again, because the truck can fall. If you start using your break too much there, your vehicle can run out of air and you are left without brakes, and you can fall back. You also have to take into account that these things works when you are going on tarmac, because if it's dirt it's very different... So that's why I'm saying that the courses are very important.

I: Can you please explain better how is the clutch used?

P5: Ok, we use to clutch to drive off... You check the revolutions, you accelerate, and according to how much you accelerate gears open, so that you can enter the gear you want. The clutch normally opens the discs and then you can select a gear. But after you drive off, you don't need the clutch because you're going fast, so you use the double gear, then the single gear, then you use the other and it comes multiplied.

I: So you never use the clutch to enter gears?

P5: Well, it's necessary and new people do it. It's because we got used to drive without the clutch... But it is necessary and it can play a part in fuel consumption... A little, but if you look at the whole year it can be something to be considered.

I: And doing that doesn't affect the transmission?

P5: No, because the transmissions are well made, and if you learn to synchronise the accelerator and you enter a gear on the right revolutions you can calibrate that. You can go to 1,200 or 1,300 revolutions and the gears are entered perfectly without using the clutch. So if you learn to do that, it doesn't affect the transmission. It continues well synchronised and it shouldn't sound, it should

run smoothly. You should look at your vehicle and see if you can use your gears without the clutch, and if it doesn't sound and you have it well synchronised it goes smoothly... You learn to play a lot with the transmission, and you are saving your clutch, your discs, and other stuff because you learn how to synchronise them.

I: Great, OK, we also had a couple of questions about you... You already told us you have a wife, but do you have children?

P5: Yes, I have two children: one lives in L.A., in the USA, and the other one is in Amsterdam. He's a professional dancer and he was competing now. He was the champion of a European contest, and now he's returning to Amsterdam.

I: So they are older... how old are you?

P5: I'm 42, but I'm very careful with what I eat. I don't eat fat or rice... I always prepare my own food, and I take it on the truck with me. I eat a lot of salads, I'm a salad lover. Of course that is very difficult on the road, and I was getting very fat before... So now when I get up I have a jumping rope and I do 100, 200 repetitions, I take a shower, and I go off to work. Not everybody does that: here it's only sit down, eat, sit down again, eat again and then sleep. I got that habit from my kids, which are very active... So when they got older they always told me: "let's go running". So I went with them and I got in the habit of exercising.

But now I have a problem in my back because I fell from the truck... I slipped with a hose and I fell on my back. It hurt a lot so now I'm in therapy. I'm going now to pick up some exams they made because recently I was looking at my mobile while walking and I stepped into what I thought was a piece of cardboard, but it was really a hole, so I got injured again.

So... In this part we are already arriving at the company. I have to say that I have already arrived here so that they can look at the vehicle, and I also have to look at the vehicle to check for any damages. That's one of the most important things that truck drivers should do. What happens is... you get in a vehicle, you do a lot of kilometres, and you don't check it. And then you sleep for 5 hours and you go again. But first you should look at the oil levels, coolant levels, and so on, you have to look at the tires, you have to look at the trailers, so that everything's fine. That's very important. Why is that? Because on the 400 kilometres that you did that day, something can go wrong. You have to look at the fuel, you have to take out the air from the fuel... That's why it's very important, I repeat, to do proper courses with these vehicles that function at very high temperatures. They are "red" engines, they have to be very hot to work right. So everything gets used more. So that's why it's important to get on your knees and look all the way below the brakes. You can take out the breaks and look how they are, you can calibrate the brakes. That's another advantage we have in this company: you can call the control centre and say that you want to calibrate the brakes and they authorise it. We are not forced to do this because we are not mechanics, but we have to be sure that everything is working fine.

I: And how often do you wash the trucks?

P5: Here they give us two washes per month, one general that includes the engine (to look for failures and so on also), and the other one that is superficial. The advantage is that since we work with grains and they get your truck very dirty, you can call your supervisor and ask them to let you wash your vehicle. Since we carry these heavy loads of wheat and corn, it gets dirty... So when you ask your boss what you are doing tonight, and he says that you have to drive, you can ask him to

get the truck washed. And since the company's washers are being repaired now, they tell you where to take it. It's an aesthetic thing, but we are also carrying food, so it's important. Also dirt sometimes covers failures or air intakes.

I: And what do you do if you get a failure on the road?

P5: You have to first stop, of course where it's safe. If the vehicle says that there's something wrong but you can keep going, then you do it when there's space you stop. So what happens? There's a failure, the truck stopped. You have to put signals on the road and tell the company right away because we only have 2 signs in the truck, and if it's at night it's dangerous. You also have to wear a vest, and have a flashlight, because we're going to walk for 12 or 13 metres behind us... And there's people that go in their cars without looking around, like donkeys, they look only to the front, so we have to get ourselves noticed.

For failures, we have codes. We turn off the truck and we open the switch again, and it shows a number... So I call the engineer and say: "this is the code it's displaying, it doesn't turn on". So the engineer checks the code and tells you what is it: if you have to look at something or if you have to wait while send you a replacement part to be installed. This vehicle is made of sensors, so sometimes it's also the sensor and we have to clean them. If I turn on again the vehicle and everything is right, it means it was just the sensor...

I: Right, so here you are trying to park. How is that done?

P5: Yes, parking is difficult, and you have to learn it and be very aware of it. So first you turn off the music, did you see? You also have to lower your windows so you can hear if someone is screaming at you, or saying something. If you haven't done that and you have the music on you won't hear it. I always have two pair of shoes in the truck, some trainers to drive and I have to wear my security boots when I'm outside the vehicle. This is the most important part of courses, because in trucks your reverse with opposite directions. You sometimes have to go out of the truck and look if you fit. There are people that only make an estimation and then damage all kinds of things. This is something that is learnt with experience. Here in this company it's easier, because all drivers are well trained, so you can park anywhere... For example that's what happens here: I was going to park in a specific spot and they told me that they had to change four of my wheels. You look at those wheels and they are good, but they change them anyways... Not all companies do that.

I: So they changed them because of the kilometres they have, even if they are in good condition?

P5: Yes, they are always very careful with that here, because old tyres are the cause of many accidents. You're trying to break and they blow up, and the truck doesn't stop because you have only the metal part of your wheel... It's not very common that companies do that, I can tell you... I know a lot of them, and security is not as here. You see a lot of vehicles in other companies that for example have wires showing in the wheels. You tell your boss and he says: "too bad, that can still hold another trip to Medellin". And when they change it, they put old ones as well. Here it's not like that, they put new tyres always.

In that part I'm reporting to the boss of tyres a small escape I have in wheel number 8, so he asked me if everything is all right with the others, or if I need some air. I say that I need air in all of them just in case, so he makes a note of that. They take good care of us here, they look at everything: the fuel consumption, the speed, how is the vehicle inside and out, maintenance, how are the tyres, and so on. Because then you get an exploded tyre, and they check and you haven't calibrated

your tyres in a long time, or if you did it yourself you don't have any proof... We also have a long hose on the truck to calibrate it ourselves if we are in the road. We put our jackets on and we calibrate them.

I: Anything else you want to tell us?

P5: Yes, I would recommend to other drivers to be very prudent, to go slowly always, and to behave well. There are a lot of jobs in other companies, but finding good company is difficult. Here they watch all these things, and that's why a lot of people get in and out in short periods of time. I always say to the other drivers: "here they are watching you, so why do you complicate your life?" They even train us, they say what you can do and what you can't do... And in general they take care of us, even in a personal level: if you slept well, if something happens on the road... And the police works a lot with this company. The trucks from this company are not often stopped by the police because they know we have a GPS system, and so on. It's really not that difficult, we only have to answer the company's calls and to call them if we want to stop or if they ask us where we are, and so on... But there's other drivers that don't see it that way. The GPS area calls them and asks where they are, and they only answer: "why do you ask, you are seeing me in your screen". That's not a good answer.

So for example, today they called me and they said that my supervisor asked me to stop in a certain place... But there are other drivers that say: "I won't stop because I'm very sleepy, and I don't care". But it doesn't cost anything to be a decent person and comply...

We have to be very patient of course in this work... We sometimes can load a truck in one day, but sometimes it takes 3 days... Of course that's better in this company because we have continuous cargo... For example, just now they asked me what I was doing, so I answered I was coming to the company. They told me they had some cargo that needed to be moved to Cartago, so I told them that I couldn't do it because I hadn't slept well last night. So they told me: "I'm sorry, I'm sorry, you have to rest before" ...

I: Do you speak with other drivers on your mobile?

P5: Yes, I use a hands-free device, I always have it on me. Not here in the recording because I was assigned a mission, so what was I going to speak about?

We speak bad of everyone but we never tell them, that always happens... We always talk a lot... We get lazy, we get sleepy, so one calls the other. "Where are you? What are you doing? Why are you calling? Because I'm sleepy... You should rest... No, I still can do it..." Bullshit like that, that helps a lot. Like a friend says: "If you are sleepy take your shoes off... and go to sleep. Stop screwing around". Because you can fall asleep with your eyes open, and an accident can happen in a few seconds... You die, and that's it. Or you cause an accident, you kill someone in a motorcycle... Many drivers have gone through that. There was one that was always complaining of headaches, and when he went to the doctor they told him that it was nothing. So in the road from Río Frío to La Unión Valle, he crashed and he doesn't know what happened. And when they checked, that headache was a brain tumour. Like I always say: in this company if you're not OK you can ask them for time to fix it... For example I will now sleep for 4 or 5 hours and I will go to Palmira to get some results of the exams I did yesterday... To see how I am. If you don't take care of yourself, who is going to?

Another thing that you have to do in this job is to leave your home problems on your home. Because if you are driving a vehicle such as this and you have problems, you won't co-ordinate right and you won't be in control of the truck. If you are not in the right conditions it's better that you don't drive. Why is that? Because there are people that fight with their wives on the mobile phone while they are driving. I have seen many cases, and what happens? There was a friend of mine that had problems at home. He found his wife with another man. He was having trouble concentrating and he stopped on a place that is not authorised, and when they called him and he answered in a very bad manner. So they told him he couldn't continue working in the company because he couldn't follow orders. He was a very good friend of mine, a good worker, but the company doesn't want him back because of those situations. And then you regret it you: are out of a job, and you don't have a wife...

I: And do you meet outside of work with other drivers?

P5: Of course, we live around here and we go out near sometimes. But here it's very clear: if you're drunk you can't drive. They give you two or three days to get better. The security area makes drug tests and alcohol tests, and there has been cases of people that smoke marijuana, and that's an automatic contract cancellation. So that's why drivers in other companies call us the rehabilitated. If you have a letter from this company you can get work almost in any other company, because you are rehabilitated... The company cares a lot about that. There are many good drivers here...

OK, so I have to go now because I have to sleep... It was very nice meeting yo

Annex 15. Copies of intervention mechanisms used (Study 3)

Case Study 1

Treatment 1: Group Summary Information (Remote) intervention mechanisms

Participants received the following business card:

¡Ayúdenos a ahorrar combustible!

Hola [NAME]

¿sabía que su consumo promedio de combustible es más [HIGHER/LOWER] que el del [NUMBER] de los conductores de la empresa?

Consumo mensual: Su promedio [NUMBER] Promedio empresa [NUMBER]

Calendario 2018

AGOSTO 2018	AGOSTO 2018	SEPTIEMBRE 2018	OCTUBRE 2018
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
... (rest of the calendar content follows a similar pattern for all months)

“Help us to save fuel! Hello [NAME], did you know that your average fuel consumption is [HIGHER/LOWER] than the average of drivers in the company?

Monthly consumption: your average [NUMBER] – company average [NUMBER]

[WELL DONE! / PLEASE HELP US TO CONTINUE SAVING!]”

Treatment 2: Exposure to Behaviours and Opinions (Remote/In-situ) intervention mechanisms

Participants attended 10-minute sessions in the “driver’s lounge” of the company headquarters in small groups of 10-15 drivers at a time. In the session, they:

- Watched a 4-minute video, available with English subtitles at: <https://youtu.be/wylYeNZWpSQ>
- Received the following flip-flop truck decoration:



- Received the following flip-flop keychain:



“Turn down the flip-flop”

Case Study 2

Treatment 3: Group Summary Information and Exposure to Behaviours and Opinions (Remote/In-situ) intervention mechanisms

Participants attended 15-minute sessions in the “driver’s lounge” of the company headquarters in small groups of 10-15 drivers at a time. In the session, they:

- An edited version of the video in treatment 2, with a few additional seconds explaining the “Lightbox 1”: <https://youtu.be/ql1ObZvgRfl>
- Engaged in a short discussion about why they thought it was important to “reduce the flip-flop” and what everyday actions could help achieve it

- Had the “Lightbox 1” (called “*flip-flop-o-meter*” in the intervention) installed in their trucks, a technological device created by Paulius Yamin using the open-source Arduino language. It consisted of a small plastic box that would flash 6 red LED lights around a flip-flop and a “reduce the flip-flop message” when drivers would accelerate suddenly. The hardware consisted of an Arduino Uno board and GY-521 accelerometer-gyroscope connected to 6 LED lights.



- Received the following messages to their company mobile phones:
 - o 4 weeks after the session:

“Good morning [NAME], did you know that your average fuel consumption is [HIGHER/LOWER] than the average of drivers in the company? Monthly consumption: your average [NUMBER] – company average [NUMBER].

[AUDIO RECORDING WITH POPULAR SONG TURNED INTO: “CALMLY, LET’S TURN DOWN THE FLIP-FLOP”]

Thanks a lot for turning down the flip-flop in these last few weeks!

A message from the flip-flop-o-meter”
 - o 7 weeks after the session:

“Good morning [NAME]. Do you know what is the flip-flop festival? Come with me to see this funny story: [LINK TO INTERVENTION VIDEO].

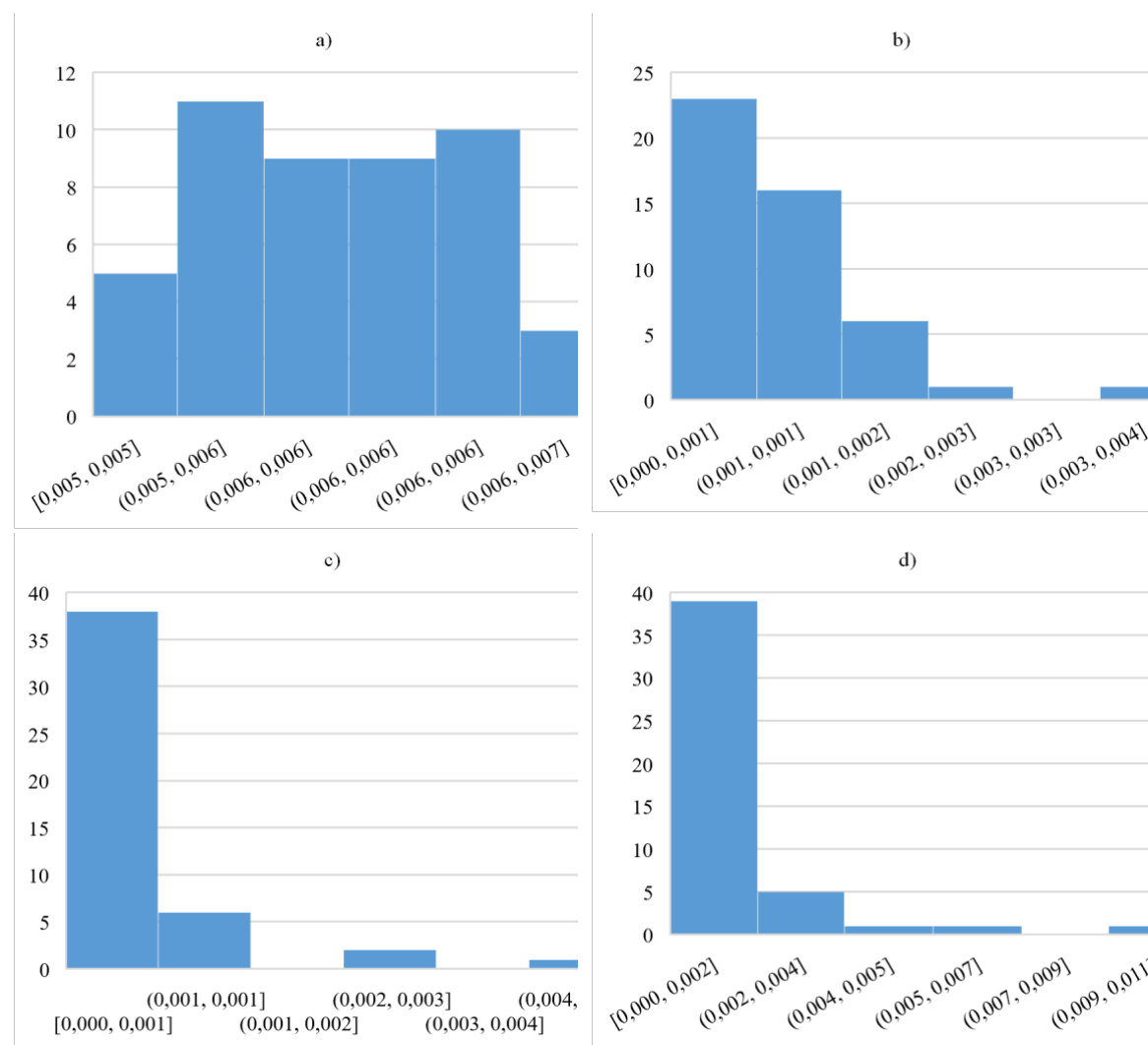
A message from the flip-flop-o-meter”
 - o 9 weeks after the session:

“Dear drivers from company X: thanks a lot for turning down the flip-flop! The flip-flop-o-meter is happy. Please, give the flip-flop-o-meter to Y in the Z area. And remember keep turning down that flip-flop!”

Annex 16. Experimental data summary table (Study 3)

Annex 17. Experimental data distribution for Driving Parameter Alerts (DPAs) (Study 3)

Data distribution for DPAs in Case Study 2 (GSI+EBO(R/I) treatment and control groups)



Data distribution for GSI+EBO(R/I) control group: a) distance travelled with one gallon of fuel; b) sudden accelerations (events per 10,000 kms); c) sudden braking (events per 10,000 kms); d) speed excesses (events per 10,000 kms)

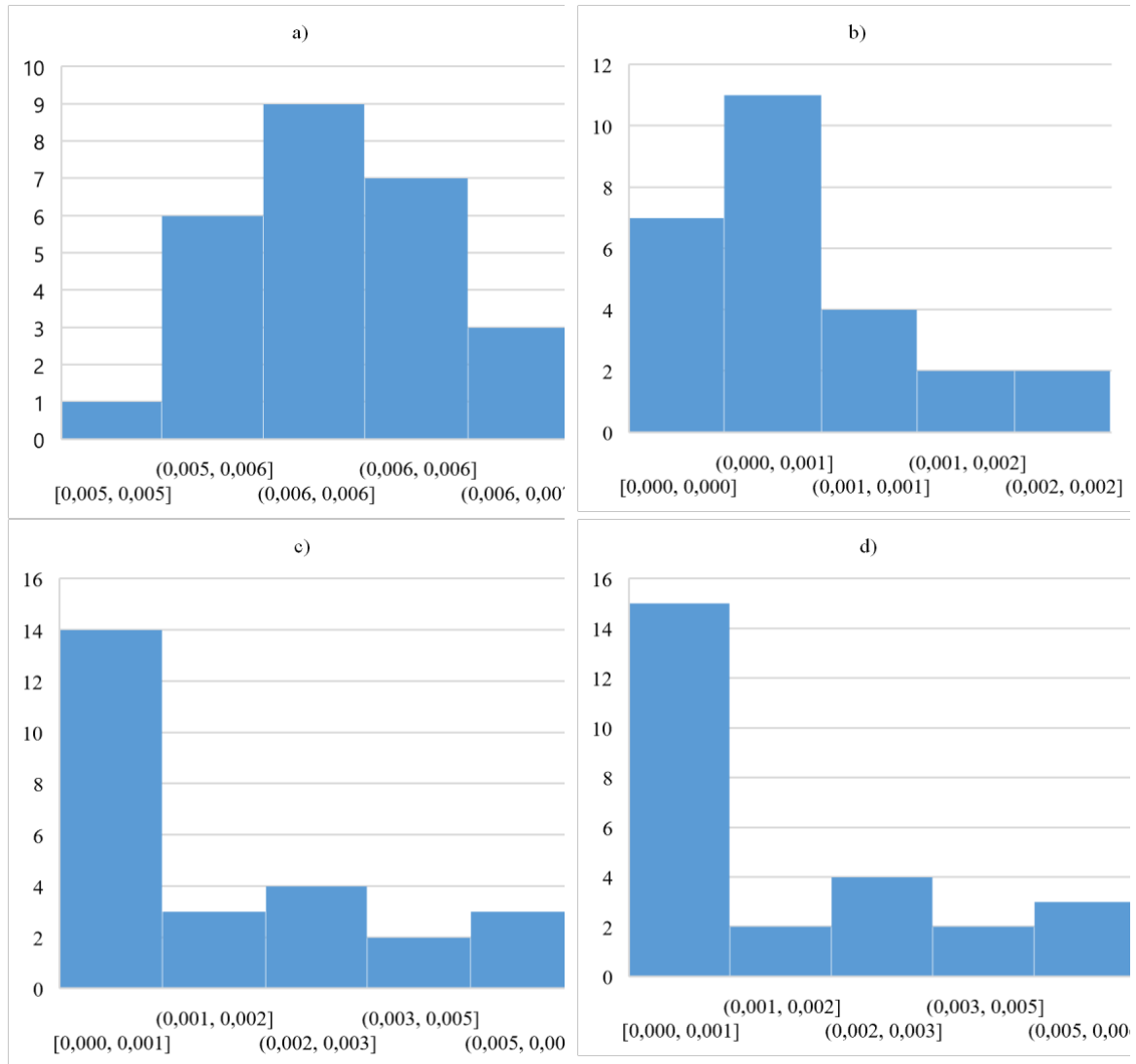


Figure 10. Data distribution for GSI+EBO(R/I) treatment group: a) distance travelled with one gallon of fuel; b) sudden accelerations (events per 10,000 kms); c) sudden braking (events per 10,000 kms); d) speed excesses (events per 10,000 kms)